21862

NATIONAL LIBRARY
OTTAWA

CANADA

BIBLIOTHÈQUE NATIONALE
OTTAWA

NAME OF AUTHOR.... Grace Johnston.....

TITLE OF THESIS... Accuracy of Emergency...
...Department Staff in...
...Classifying the Urgency of Patients

UNIVERSITY... of Alberta.....

DEGREE FOR WHICH THESIS WAS PRESENTED.... M.H.S.A.....

YEAR THIS DEGREE GRANTED.... 1974.....

Permission is hereby granted to THE NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed)... Grace Johnston

PERMANENT ADDRESS:

...Apt 25, 75 Tiger St S
...Hamilton, Ontario
...L8P 3C6...

DATED... June 7.....1974

NL-91 (10-68)

THE UNIVERSITY OF ALBERTA

ACCURACY OF EMERGENCY DEPARTMENT STAFF IN CLASSIFYING THE URGENCY OF PATIENTS

by

© GRACE JOHNSTON

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF HEALTH SERVICES ADMINISTRATION

DIVISION OF HEALTH SERVICES ADMINISTRATION

DEPARTMENT OF COMMUNITY MEDICINE

EDMONTON, ALBERTA

FALL, 1974

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Accuracy of Emergency Department Staff in Classifying the Urgency of Patients submitted by Grace Johnston in partial fulfilment of the requirements for the degree of Master of Health Services Administration.

.....
Supervisor

.....

.....

Date.....

ABSTRACT

Numerous authors have proposed instituting a patient sorting, or triage, system. At the same time, there is a paucity of information on the effect of training and experience on the ability of persons to sort emergency department patients. Consequently, this study was designed to investigate the accuracy of emergency department clerks, nurses, and physicians in classifying patients' conditions as emergent, urgent, or nonurgent. These classification categories have been widely used in the literature and their criteria were more comprehensive than other emergency department patient classifications. A second component of the study was the examination of an indirect measure of the patient's perception of the urgency of his own condition.

The study was carried out in two Edmonton emergency departments in June 1973. The nonrandom patient sample was restricted to patients seen by emergency physicians in no more than seven consecutive 24 hour days. The study was not carried out at the same time in both hospitals. The clerk's assessment and the indirect measure of the patient's perception of urgency was only obtained for one of the two hospitals.

The estimate of "true urgency", which was used to calculate the accuracy of the staff and patient assessments, was the rating assigned independently by at least two of

three physicians who reviewed the patient records. These "panel" physicians did not agree unanimously on their urgency ratings for almost half of the patient records. Most of the patients were classified urgent or nonurgent.

Kendall's correlation coefficients, percentages of agreement, and chi square goodness of fit tests were used to measure the agreement of the staff and patient ratings with the "true urgency" estimates. No significant differences were apparent between the accuracy of the emergency physician, nurse, and the indirect patient urgency ratings. The ability of the clerk closely approached that of the other staff, although she tended to be more conservative in her assessments. Experience did not appear to influence the accuracy of the staff.

The sampling design of this study was inadequate for the generalization of the findings. While the ability of the staff to classify patients was measured, an actual triage situation was not simulated.

The findings of this study demonstrate the need for refinement of "true urgency" criteria, more extensive examination of factors influencing the ability of staff to classify patients, and further investigation into the accuracy of the patients to categorize themselves.

TABLE OF CONTENTS

CHAPTER		PAGE
I	INTRODUCTION	1
	Statement and Importance of the Problem	1
	Summary of Methodology	1
	Limitations of the Study	3
	Internal Validity	3
	External Validity	4
	Definition of Terms	6
	Summary	7
II	SOME RELEVANT LITERATURE	9
	Need for a Classification System	9
	Development of Screening Criteria	11
	Who is capable of Classifying Emergency Department Patients?	13
	Summary	17
III	METHODOLOGY	18
	Optimal Design	18
	Actual Design Employed	29
	Hospital A	36
	Hospital B	37
	Summary	37
IV	ANALYSIS AND INTERPRETATION	39
	Introduction	39
	Report of Missing Data	39
	Analysis of Urgency Ratings assigned by the Panel Physicians	44
	Analysis of Urgency Ratings assigned by the Staff	49

Effect of Experience on Ability of Staff to Rate Urgency..... 57

Patient's Perception of Urgency..... 61

Who Answered Questions..... 61

Length of Time Aware of Problem..... 62

Medical Facility Required: Hospital A..... 64

Composite Patient Urgency Rating: Hospital B..... 64

Physician Contacted Prior to Visit: Hospital B..... 68

Summary of Patient's Perception of Urgency..... 70

Factors Influencing the Accuracy of the Urgency Ratings..... 70

Summary..... 75

V SUMMARY AND RECOMMENDATIONS..... 78

Summary..... 78

Recommendations..... 85

REFERENCES..... 87

APPENDIX A..... 95

APPENDIX B..... 98

LIST OF TABLES

Table	Description	Page
1.	Extent of incomplete data collection	40
2.	Percentages of agreement and Kendall correlation coefficients for urgency ratings assigned by the staff and panel	46
3.	Frequency of various combinations of panel physician urgency ratings	48
4.	Number of cases where staff ratings agreed with at least one of the panel ratings	51
5.	Percent emergent, urgent, and nonurgent by person making assessment and test for chi square goodness of fit	53
6.	Cases of disagreement between staff and true urgency assessments	55
7.	Cases of agreement between staff and true urgency assessments for the three urgency categories	55
8.	Measures of accuracy between the various staff experience combinations and the true urgency ratings for hospitals A and B combined	58
9.	Length of time patient has been aware of problem by true urgency rating	63
10.	Hospital A: Patient's perception of medical facility required by true urgency rating	65
11.	Hospital A: Agreement between patient urgency variables and true urgency rating	66
12.	Hospital B: Patient's attempt to contact a doctor before coming to the emergency department by true urgency rating	69
13.	Percentages of agreement between staff urgency ratings and true urgency ratings dichotomized by adequacy of patient record information for hospital A	72
14.	Kendall correlation coefficients between the staff and true urgency ratings by shift	74

LIST OF FIGURES

Figure		Page
1.	Optimal design	19
2.	Optimal sampling design	23
3.	Modified design for hospital A	31
4.	Modified design for hospital B	33

CHAPTER ONE

INTRODUCTION

Statement and Importance of the Problem

The demand for service from emergency departments is increasing, creating the need to examine improved modes for delivery of these services. One popular idea is the institution of a 'triage officer' to sort patients and direct them to the most appropriate care center, whether it be a convenience clinic, their own physician, the emergency department, or some other source of health care.

Up to the present time, little has been written on the training and experience necessary for a triage officer. Therefore, this study was designed to provide a foundation for examining the effect of training and experience on the ability of emergency department staff to classify patients.

Summary of Methodology

Clerks, nurses, and emergency physicians, hereafter referred to as the "staff", classified the urgency of patients in two emergency departments. The selection of the patient sample was nonrandomized and restricted to visits of no more than 7 consecutive 24 hour days in June 1973.

An actual triage practice was not simulated for the following reasons: (1) the staff had no exposure to the functioning of an actual triage practice; (2) the staff received no instruction on classifying patients, other than being provided with definitions and examples of the urgency categories; and (3) the classification categories were descriptive rather than practical triage referral options. Although design steps could have been taken to rectify the latter two points, a simulated triage would have limited generalizability because triage criteria are dependent upon the health resources available for referral and thus vary somewhat from one hospital to another. Therefore, urgency criteria (which have been shown to be related to triage decisions and utilized to a greater extent than triage criteria (cf. Ch. 2)) were chosen for use in this study.

During the course of the study, each type of staff classified emergency department patients as 'emergent', 'urgent', or 'nonurgent' from an initial observation of the patients. The definitions of the urgency categories employed were those used by Vayda, Gent, and Paisley (1972). Along with each urgency rating, the staff member also indicated the extent of his (or her) emergency department experience. In addition, an indirect measure of the patient's perception of the urgency of his condition was obtained by having each patient answer questions related to the urgency criteria.

About two weeks later, a "panel" in each hospital reviewed up to 275 patient records from the respective emergency departments and assigned final urgency ratings. The composition of the respective panels was three physicians from each of the two hospitals who were familiar with the functioning of the emergency department. Panel physicians I, II, and III were from hospital A and panel physicians IV, V, and VI were from hospital B. The independent rating assigned by the three physicians in each hospital was used to define the "true urgency" of the patient. This "true urgency" rating was then used as a criterion for purposes of estimating the ability of the staff to classify patients. Finally, information (which the investigator believed might influence the accuracy of the staff assessments) was also abstracted from the patient records when they were retrieved for the panel review.

Limitations of the Study

Internal Validity

Factors were present in this study which may have jeopardized the interpretation of the findings.

Firstly, while all staff members participating in the study were asked to become familiar with and employ the predefined urgency criteria, there is no assurance that individual staff members did not disregard these definitions

and use their own interpretation of the terms 'emergent', 'urgent', and 'nonurgent'.

Secondly, the staff members were to assign urgency ratings to the patients without the knowledge of another staff member's rating. While steps were taken to maintain this independence, the investigator is not assured that inter-staff collaboration was entirely eliminated. However, since the staff were exceptionally busy during the time of the study, consultations were probably minimal. On the other hand, this increased workload may have created the undesirable effect of curtailing the staff's actual ability to classify patients.

Thirdly, "panel" members (cf. p. 3) were limited in their final assignment of an urgency rating by being restricted to the patient records. Lab and x-ray results were missing from some patient charts, and no evaluation of the patient's condition after he left the emergency department was available.

External Validity

Definitive conclusions as to the effect of experience and training on the ability of clerks, nurses, and physicians would have necessitated the selection of a random sample of registration clerks, nurses, and physicians from the population to which one wished to generalize (e.g.,

clerks, nurses, and physicians in Edmonton emergency departments). Since this was not possible, the investigator chose to carry out the study using nonrandom samples, but replicating the study to see if a common pattern emerged. In other words, this design does not allow one to assume that the staff's ability in any one hospital has any meaning for the staff in another hospital; but by carrying out the same study in more than one hospital, a measure of inter-hospital variation in staff perception was obtained. Here too, it must be remembered that the hospitals studied were not randomly selected.

The investigator was limited to assessing the capabilities of the three types of emergency staff (clerk, nurse, emergency physician) in classifying patients according to the urgency of their conditions. These staff members had no formal initiation into this role. Therefore, the investigator wishes to point out that with training, experience and practical triage alternatives, the level of judgement of the various types of staff might be significantly altered. Baldridge (1966) claims that a triage nurse improves her skill by knowledge gained from her mistakes.

The utility of the data which was collected from the patient records is limited to accounting for variations observed in assigning urgency ratings since: (1) The sample

studied was consecutive patients seen by emergency physicians in a very short, summer time period. Therefore, the sample was not representative of all services being provided by the emergency department for an entire year. (2) The study was carried out while the emergency department of a third hospital was closed. Thus, the caseloads of the two hospitals studied were probably atypical.

Definition of Terms

An emergency department is

> the facilities and services provided primarily for the management of outpatients coming to the hospital for treatment of conditions determined clinically or considered by the patient or his representative to require immediate medical care in the hospital environment (American Hospital Association, 1972, p. viii).

An emergent condition

> requries immediate medical attention; time delay is harmful to patient; disorder is acute and potentially threatening to life or function.
> Cases of this type will usually require hospitalization (Vayda, Gent, & Paisley, 1972, p. 6).

An urgent condition

> requires medical attention within a period of a few hours; there is possible danger to patient or to ultimate outcome if not promptly medically attended; disorder is of acute onset but not necessarily severe or life threatening.
> Will usually not, but may require hospitalization. (Vayda, Gent, & Paisley, 1972, p. 6).

A nonurgent condition

> does not require the resources of an emergency service; symptoms of long duration without sudden change in severity; referral for routine medical care is all that is needed; disorder is not acute and minor severity. Routine care in a physicians office or no medical care required (Vayda, Gent, & Paisley, 1972, p. 6).

A registration clerk is a person with no medical or nursing training who is employed to record demographic patient information for an emergency department.

A nurse is a registered nurse as defined by The Registered Nurses Act (R.S.A. 1955, c. 283) who renders nursing care full or part time in an emergency department.

An emergency physician is a medical practitioner as defined by The Medical Profession Act (R.S.A. 1955, c. 198) who is responsible for full or part time coverage of an emergency department.

Triage means an

> immediate, brief medical evaluation of all incoming patients, determination of the general nature of the problem and the kind of service needed and appropriate referral. (Weinerman & Edwards, 1964, p. 57).

A triage officer is one who

> interviews each patient who arrives in the emergency department, assesses his presenting problem, and determines priorities in securing care expeditiously (O'Boyle, 1972, p. 1394).

Summary

By examining the relationship between (1) the ability of the staff to assess the urgency of patients in emergency

departments, and (2) the type of training and length of experience of these staff members, it was hoped that this study would provide information that would assist in developing training and experience standards required for triage officers. Before discussing this study in further detail, literature pertinent to this investigation will be presented.

CHAPTER TWO

SOME RELEVANT LITERATURE

Need for a Classification System

For many years concern has been expressed over the increasing demands being made of emergency departments (Webb, 1969, pp. 13-15). Since this phenomenon is not expected to disappear (Roth, 1971, p. 319; Gibson, 1973a), many solutions have been proposed for relieving this expansion problem; most of which require that 'nonurgent' patients receive differential treatment. Other reasons advanced for decreasing the use of emergency departments for the treatment of nonurgent conditions are that this would remove one source of staff dissatisfaction (Bainbridge, 1972), and insure a more appropriate use of emergency resources (Fahey, 1964, p. 96; Westcott, 1971).

As early as the 1950's, it was realized that emergency rooms were providing medical care to patients with nonurgent conditions and not being used solely for acute conditions of recent onset (Howell & Buerki, 1957; Reifler, 1957; Shortliffe, Hamilton, & Noroian, 1958). During the 1950's, these authors proposed that emergency rooms should be expanded to serve all persons seeking care.

Since then, however, attempts have been made to control the expansion of emergency facilities by educating the public not to misuse emergency services (Skudder, McCarrol, & Wade, 1961; Fahey, 1964, pp. 98-103; Silver, Manegold, & Gartland, 1966; Bain & Johnson, 1971; Bainbridge, 1972), although in one study this practice ".... alienated some patients and opened the hospital to criticism [Kirkpatrick & Taubenhaus, 1967, p. 22]." Baltzan (1972) reports that the introduction of utilization fees appears to have no effect in limiting the demands made of the emergency department.

Many authors (Lee, Solon, & Sheps, 1960; Kluge, Wegryn, & Lemley, 1965; Beloff, 1968; Booker & Vansant, 1969; Rosenfeld, 1971, pp. II 63-69 & VIII 39; Roy, 1971; Hart, 1972; Gibson, 1973b) have favored the development of comprehensive ambulatory care programs to meet the wide variety of service demands being made on emergency departments. In an attempt to provide care for nonemergent conditions, for which emergency departments have been deemed inadequate (Kirkpatrick & Taubenhaus, 1967; Brook & Stevenson, 1970; Jonas, 1971; Nahum, 1971), facilities both within the hospital (Jacobs, Gavett, Raquso, & Thurber, 1972; Morgan, 1972; Gibson, 1973a; Taubenhaus, 1973) and in the community (Paris & Callan, 1968; Brown, 1971; Hochheiser, Woodword & Charney, 1971; Moore, Bernstein, &

Bonanno, 1972) have been proposed.

Whatever the sources of this convenience service may be, a means of sorting patients for such care must be formulated. While various authors cite the need for an effective triage program (Weinerman & Edwards, 1964; Estampador, Kessler & Scott, 1968; Schwartzman, 1971, p. 22; Stewart, Robertson, Chipman, & Gordon, 1971, p. 51; Gibson, 1973a; Lowe & Baker, 1973; Taubenhaus & Simon, 1973), few studies have suggested sorting criteria and the level of training and experience necessary to use this criteria.

Development of Screening Criteria

Attempts to classify emergency department patients are prevalent in the literature on emergency services. Vaughan and Gamester (1966) devised an illness classification system based on a trauma-nontrauma dichotomy. Reed and Reader (1967) classified patients according to the severity of their conditions. Alpert, Kosa, Haggerty, Robertson, and Heagarty (1969) investigated groups of emergency department patients on the basis of the stability of their hospital and doctor relationships. Booker and Vansant (1969) labelled visits as necessary or unnecessary. Garraway (1969) assessed the illnesses and injuries presented by patients as very serious, serious, quite serious, moderate, or minor. Teglas (1969) defined patients as minor, intermediate, or major emergencies; major emergencies were those which presented a threat to the patient's life or well

being, minor emergencies presented no such threat, and the intermediate group was comprised of borderline cases. Hess (1970) used the terms emergency and quasi emergency. Roth, Douglas, and Howe (1971) described patients according to the emergency department staff's perception of the legitimacy of the demand for service. Recently, Allen, Barnard, Falk, Higgs, and McCracken (1973) have employed five categories of severity: extreme emergencies, acute emergencies, minor emergencies, trivia, and elective.

The most common classification is an emergent, urgent, or nonurgent assessment (Lee, Solon, & Sheps, 1960; Lavenhar, Ratner, & Weinerman, 1968; Robinson, Kinnis, Anderson, Argue, & Miller, 1969; Webb, 1969; Perkoff & Anderson, 1970; White & O'Connor, 1970; Bain & Johnson, 1971; Vayda, Gent, & Paisley, 1972; Chipman, Reid, & Gordon, 1973; Davis, 1973; McDonald, McDonald, Steinmetz, Enterline, & Salter, 1973; Walker, 1973), or variations of these categories: emergency, nonemergency (Read, 1966); emergency, nonemergency, did not need to be seen (Kirkpatrick & Taubenhaus, 1967); emergent, urgent, elective (Trier & Levy, 1969); and urgent, semi-urgent, non-urgent (Fox & Mullany, 1973). It must be noted that such classifications were designed to describe the emergency department patient mix and not as screening criteria the latter being a function of the referral options available in each emergency department (O'Boyle, 1972).

A few studies have presented triage criteria for screening patients arriving at an emergency department. Walker (1973) listed symptomatic criteria for use in limiting emergency care to those conditions of " ... sufficient magnitude to necessitate the use of an emergency room [p. 28]." The categorization of patients made by using these criteria was related to an emergent-urgent, nonurgent dichotomy at a level of significance of 0.05 (p. 29). Vayda, Gent & Paisley (1973a, 1973b) proposed criteria for triage decisions which were based on a ranking of seriousness of presenting complaints. Here too, a relationship was observed between decisions based on the triage criteria and an emergent-urgent, nonurgent classification.

Boyd, Mains, & Flashner (1972) have described a Critical Injury Index. Kirkpatrick and Youmans (1971; Kirkpatrick, 1972) have designed and tested a Trauma Index. These indexes were designed so that ambulance attendants, police officers and the public could determine the most appropriate level of facility required by an accident victim.

Who is capable of Classifying Emergency Department Patients?

While outlining the statewide Illinois Trauma Program, Boyd, Mains, and Flashner (1973) emphasized that

> a major commitment must be made to the early separation of all patients with critical injuries or illnesses from the larger group of

> outpatients who have beleagured today's emergency departments [p. 282].

In Illinois, law enforcement officers and ambulance attendants initiate transport to the most appropriate treatment center for accident victims. These authors decry the practice of using anyone but the most experienced and capable individual as a triage officer in the emergency department, but offer no proof that the practice of using nonprofessionals is inadequate.

Some emergency departments use a physician as a triage officer (Weinerman & Edwards, 1964; Saxl, 1970). While describing a triage case study, Beloff (1968) states that " ... the most important requisite is a comprehensive, competent, and interested physician to do triage [p. 69]." Others feel less qualified persons may be as effective (Baldridge, 1966; Canizaro, 1971). Taubenhaus and Simon (1973) report that in a small emergency department in a resort area " ... triage is performed by every member of the department from clerk to physician [p. 43]."

Jones & Shires (1969) state that nurses make correct triage decisions 98% of the time. Canizaro (1971) reports that nurses send less than 5% of patients to the wrong area. However, qualifications for a triage nurse are not well established. Slater (1970, p. 52) advises a minimum of 3 months orientation before a nurse is ready to accept the responsibilities of a triage nurse, while Jones and Shires

(1969) and Canizaro (1971) state that nurses with several years experience are required. Folse (1971) and Rudolf (1971) maintain that a well-trained nurse can adequately carry out this role. Hart (1972) and Vayda, Gent, and Paisley (1973a, 1973b) see triage as a possible role for nurse practitioners.

Recently there has been interest in involving patients in a more active, informed, participating role in their health care (Nader group plans manual for hospital users, 1973; Schlesinger, 1973) and in investigating the opinions of the consumers of ambulatory health services (Sussman, Caplan, Haug, & Stern, 1967; Jesion, 1970; Davis, 1971). It seems expedient, therefore, to also assess how the patient views the urgency of his condition. The recent study of Maddox and Douglass (1973) noted that patient self-ratings were better predictors of subsequent physician ratings than vice versa. If indeed patients are better able to predict their future health needs, this lends further support to soliciting patients' opinions on the urgency of their condition.

Some statements on utilizing and examining patient judgements are available. O'Connor (1972) has proposed a system of self-triage. Downey (1973) reports that a large sign in the emergency room explaining the function of an adjacent walk-in ambulatory clinic enables most patients to

triage themselves. Bain and Johnson (1971) used similar urgency scales for a physician-patient comparison of urgency assessments. It is interesting to note that the patients viewed more cases as nonurgent than did the physicians. Garraway (1969) reported that 61.5% of patients gave a similar assessment to the Casualty Officer regarding the seriousness of their injury. Davis (1971, pp. 87-93), while examining variations in perception of urgency by patients with nonurgent conditions, developed a composite score of perceived urgency comprised of feeling state, interference with function, and extent of worry components. She stated that:

> At best, the composite score of perceived urgency is a crude index of symptom perception, and neither the validity or the reliability of the measurement tool were ever established. [Davis, 1971, p. 103].

Although it is believed that patients and health providers do not have the same perception of urgency (Hess, 1970; Coleman & Errera, 1963), few attempts have been made to determine if even professionals view urgency in the same manner. While no measure of validity was reported for most studies where a physician or nurse assigned an urgency rating to patients based on a record review (Lee, Solon, & Sheps, 1960; Gala, 1969; Webb, 1969; Perkoff & Anderson, 1970; Jacobs, Gavett, & Wersinger, 1971; Kirpatrick & Taubenhaus, 1967), two studies did include an independent

urgency reassessment. Vayda reviewed an 11% sample of patient charts which had been previously categorized as emergent, urgent, or nonurgent by emergency physicians. He observed an 80% agreement between himself and the emergency physicians (Vayda, Gent, & Paisley, 1972, p. 9). Ambuel, Cebulla, Watt, and Crowne (1964), using urgency definitions based on the need for immediate follow-up of the patient, reported inter-judge reliability coefficients of 0.74 and 0.92 in an independent physician review of two samples of 146 and 139 patient records, respectively. Davis (1971, pp. 40, 41) found these urgency criteria to be lacking face validity when she used them. Therefore, she did not analyse data gathered with this instrument.

Summary

To effectively utilize emergency departments, a number of authors have suggested the institution of triage. Up to the present time, evaluation of screening criteria and the qualifications of triage officers has been very limited, even though there appears to be much variation in the literature on who is capable of carrying out this triage function.

CHAPTER THREE

METHODOLOGY

The first part of this chapter describes an optimal design for investigating the effect of training and experience on the ability of emergency department staff to classify the urgency of patients. Since compromises in the optimal design were necessary for implementation of this study, the remainder of this chapter is devoted to noting the changes that were made for the actual method employed.

Figure 1 is provided to assist the reader in understanding the following presentation (cf. pp. 18-29) of an optimal design which is considered to be the minimal requirements for eliciting valid results. The design that was implemented (cf. pp. 29-37) did not meet all the requirements of this optimal design.

Optimal design

A review of the literature (cf. ch. 2) shows that an emergent, urgent, nonurgent classification is the most widely accepted classification; and since Vayda, Gent, and Paisley (1972) have presented the most comprehensive description of these terms, their classification is

	Specifications	Instrument
a	Randomly select emergency departments (E.D.) from population of interest.	
	V	
b	Doctors from E.D. review and recommend improvements in the criteria for emergent, urgent, nonurgent conditions.	See Appendix A for classification of emergent, urgent and nonurgent conditions
	V	
c	Pretest method in hospitals; modify design and repeat pretesting, if necessary.	
	V	
d	Obtain a random sample of a minimum of 250 patients (pt.) stratified by hospital, time of day, day of week, month of year.	
	V	
e	Clerk registering patient -assesses urgency of patient -notes how long she has worked in an E.D. -marks pt. chart number on all rating forms -attaches nurse & physician rating forms to pt. chart .	See Appendix B-1 for clerk's rating form
	V	

Figure 1: Optimal design

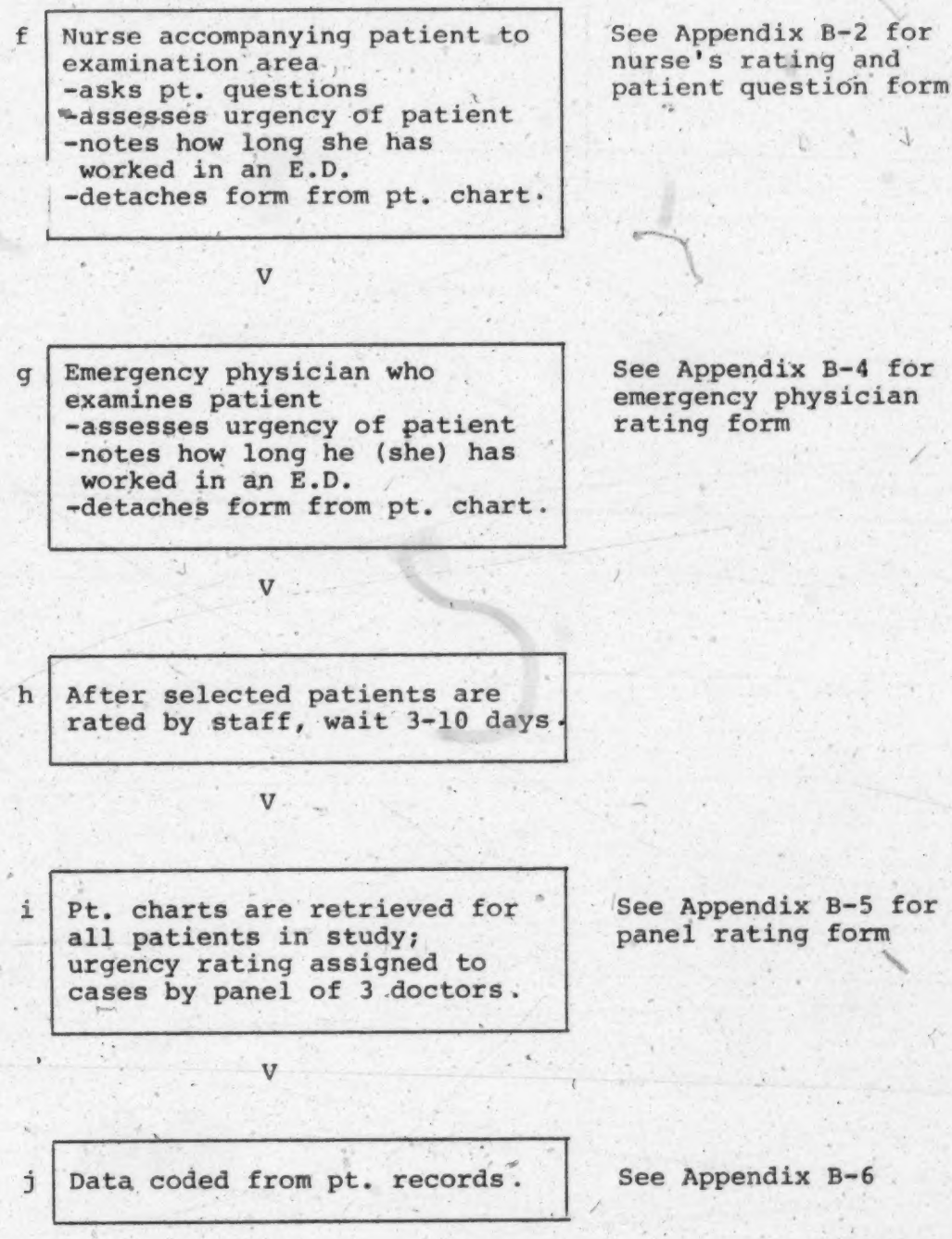
f
Nurse accompanying patient to examination area
-asks pt. questions
-assesses urgency of patient
-notes how long she has worked in an E.D.
-detaches form from pt. chart.
See Appendix B-2 for nurse's rating and patient question form
V
g
Emergency physician who examines patient
-assesses urgency of patient
-notes how long he (she) has worked in an E.D.
-detaches form from pt. chart.
See Appendix B-4 for emergency physician rating form
V
h
After selected patients are rated by staff, wait 3-10 days.
V
i
Pt. charts are retrieved for all patients in study; urgency rating assigned to cases by panel of 3 doctors.
See Appendix B-5 for panel rating form
V
j
Data coded from pt. records.
See Appendix B-6

Figure 1: Optimal design (continued)

recommended as the basis for the patient urgency ratings. However, to ensure that these urgency definitions and examples are valid for the emergency departments which have been randomly selected from all emergency departments of interest to the investigator (Figure 1.a), it is essential that the classification be reviewed and revised by persons knowledgeable of the type of service being given in each emergency department selected (Figure 1.b).

To acquaint the staff with the study methods and to identify potential sources of invalidity, a pretest of the data collection procedure is advisable. If modifications in design are necessary, they should be made and the pretest repeated (Figure 1.c).

The sample should include a minimum of 250 patients, randomized, clustered, and stratified (Figure 1.d). At least 250 subjects are needed to attain power of 0.90 for the chi square goodness of fit test, assuming a small effect size, and a level of significance of 0.05, with 2 degrees of freedom (Cohen, 1972, p. 228). Figure 2 outlines an appropriate sampling design for stratifying by variables which have been found to be related to the urgency of patients, specifically, the type of hospital (Davis, 1971, p. 13; Davis, 1973, p. 85), time of day (Gala, 1969, p. 32; Bain & Johnson, 1971, p. 36), and day of the week (Gala, 1969, p. 29; Bain & Johnson, 1971, p. 36). Although, no

studies have been found which examined changes in patient urgency by the time of the year, some studies (Barth, 1967; Roy, 1971, p. 42; Chipman, Reid, & Gordon, 1973), reported variations in volume by season. If the same number of patients are selected from time periods of unequal patient load, the responses from the samples must be weighted in a manner which ensures that no time period is over or under represented. For example, assume that it is known that on the average twice as many patients are seen during five weekdays as are seen during the weekend. Accordingly, if ten patients were selected from weekday strata and ten from weekends for one season in one hospital, then the weekday responses should be multiplied by a factor of two. Analogous weightings are also required for those seasonal and peak strata designated in Figure 2. Systematic random sampling within any one cell of Figure 2 is recommended when more patients are expected during a selected time period than the investigator wishes to sample. For example, if one wishes to study five patients but fifteen are likely to appear, then every third patient should be selected, after randomly choosing which of the first three patients entering the emergency department will be the first study patient.

	First E.D. randomly chosen				Second E.D. randomly chosen				etc.
	Weekday		Weekend		Weekday		Weekend		
	Peak	Nonpeak	Peak	Nonpeak	Peak	Nonpeak	Peak	Nonpeak	
Jan-Mar									
Apr-Jun									
Jul-Sep									
Oct-Dec									

Figure 2: Optimal sampling design

The clerk registering a selected patient records her opinion of the condition of the patient -- i.e., emergent, urgent, or nonurgent (Figure 1.e) -- on the assessment form provided (Appendix B-1). On this same form she also notes how long she has worked in an emergency department (e.g., less than 3 months, 3 months to 1 year, 1 to 2 years, or more than 2 years). The unit of measurement for experience must be kept the same for the nurse and emergency physician as well, so that comparisons can be made between types of staff on the effect of experience. If grouped data is used, the first category is defined in terms of the length of the probation period for new staff and is therefore an appropriate novice category. The last category for experience is defined in terms of the minimal time required to become very experienced in handling emergency patients. (The consensus of staff members in this study was that people who had worked in an emergency department for at least two years were very familiar with the operation of the department.) Other experience categories (e.g., 3 months to 1 year, 1 to 2 years) are arbitrarily chosen in an attempt to approximate cells of equal and sufficient size to permit significance testing of the data collected. The reader should note that the use of categories to designate length of experience (1) restricts the amount of information one is able to obtain on the effect of experience, but (2) facilitates uniformity and ease for respondents.

The clerk, after registering the patient, places the patient chart number on each data collection form to enable collation at a later date. She then attaches the nurse and physician assessment forms (Appendix B-2 & B-4) to the patient record and places her completed assessment form in a box provided at her desk.

It is unreasonable to expect patients to familiarize themselves with the complete criteria for emergent, urgent, and nonurgent, and then categorize themselves. Furthermore, such an approach is fraught with problems of attaining internal validity, particularly for those patients with nonurgent conditions. As a consequence, it is recommended that the nurse pose standardized questions (Figure 1.f), the answers to which will allow the researcher to categorize the patient into urgency categories. It is assumed, however, that these placements are made by the patients.

By reviewing the urgency classification (Appendix A), the following criteria are recommended as a suitable basis for formulating the patient questions:

emergent: ... requires immediate medical attention
... will usually require hospitalization
urgent: ... requires medical attention within a few hours
... will not usually ... require hospitalizaiton
nonurgent: ... symptoms of long duration
... routine medical care is all that is needed

For example, the following standardized questions are (at a face validity level) a reflection of the above criteria and

may provide an indirect measure of the patient's perception of the urgency of his condition.

1. How long has the patient been aware of the problem which brought him/her to the emergency department today?
-- less than 6 hours
-- 6 to 24 hours
-- 1 to 7 days
-- more than a week

2.a Does the patient think that he/she may have to stay in hospital?
-- no
-- yes

IF NO, ASK:
2.b If the patient could have obtained a doctor's appointment within the next 3 days, would this have been as convenient for him/her as coming here today?
-- no
-- yes

The responses to these questions could be recoded by criteria such as: (1) patients consider themselves to be "emergent" if they have been aware of their problem for less than 24 hours and answer "yes" to question 2.a; (2) patients consider themselves "urgent" if they have been aware of their problem for more than 24 hours, and answer "yes" to question 2.a, or have had their problem for less than 24 hours and answer "no" to question 2.b; and (3) patients consider themselves "nonurgent" if they have had their problem for more than 24 hours, and answer "no" to question 2.b or have answered "yes" to question 2.b.

After recording the patient responses, the nurse completes her assessment of the urgency of the patient's condition and indicates how long she has worked in an emergency department. She then detaches her assessment form

from the patient chart and places it in a box provided at the nursing station.

Next, the emergency physician examining the patient assigns an urgency rating to the patient before x-ray or laboratory results, or consultation has been obtained. The physician also indicates the length of time he (she) has worked in an emergency department (Figure 1.g). The emergency physician then removes this assessment form from the patient chart and places it in a box provided at the doctor's desk.

No staff member sees the urgency rating assigned by another staff member, in order that all staff assessments are kept independent. If this was not the case, staff members would have more information (i.e., ratings of other staff) than they would have in an actual triage situation.

After enough time has elapsed for the laboratory and x-ray results to be filed with the patient charts (in this study a minimum of 3 days was considered necessary by medical records personnel), (Figure 1.h), the patient charts are retrieved for review by a minimum of three physicians in each hospital (Figure 1.i). These physicians should be familiar with the functioning of an emergency department, and must have experience in treating ambulatory patients.

Since the primary objective of this study is to

determine the accuracy of staff in assessing urgency of patients' conditions, the "true urgency" of each patient is required. These "true urgency" assessments should only be made after the results of laboratory tests and x-rays are known and the patient diagnosed. Consequently, a review of patients' records by physicians appears to be a reasonable approach to attaining these assessments. If only one physician assigns urgency ratings, no measure of the reliability or validity of this physician's estimate is available. Two physicians are also inadequate since cases (where differences are encountered between the two physicians) would have to be excluded from the study. Accordingly, the results of such a study could not be interpreted because the sample would not include patients who were difficult for the "panel" (cf. p. 3) to rate. By including at least a third physician, a final urgency rating can be obtained for more patients by choosing the rating assigned by at least two physicians. By measuring the inter-judge consistency in assigned ratings, one is able to obtain a measure of reliability. Although the actual validity of the assumption of "true urgency" is not available, it is theoretically impossible for the validity coefficient to exceed the inter-judge reliability coefficient. Therefore, at least three physicians should independently review the charts of each patient in the study, and indicate (using the form in Appendix B-5) whether the patients' conditions were

in fact emergent, urgent, or nonurgent.

The accuracy of the staff in estimating the patient's "true urgency" can be reported in four ways: (1) the correlation between the staff urgency ratings and the "true urgency"; (since the data is ordinal and tied ranks are expected, the Kendall correlation coefficient is most appropriate (Blalock, 1972, p. 421)); (2) the percentage of agreement between the "true urgency" and the staff assessments; (3) the percentage of agreement between the urgency assessment(s) made by at least one panel physician and the staff assessments; and (4) the chi square goodness of fit test (Ferguson, 1971, pp. 177-182); (this last test describes the agreement between the frequency of assignment to each of the three urgency groups).

Variables are often hypothesized to account for differences in the assignment of urgency ratings by the panel or staff or the patient himself. Data for some of these variables are included in the patient records (Figure 1.k). (For this study, the investigator coded the information listed in Appendix B-6).

Actual Design Employed

Modifications to the above optimal design were necessary (see Figures 3 and 4). First, only two emergency departments were available, and accordingly no

generalizations can safely be made from a nonrandom sample of two hospitals. However, replicating the study in two hospitals did provide a crude measure of inter-hospital variation. Thus, an attempt was made to achieve some degree of external validity by replication. Since the study was simply replicated a minimum of 250 patients were now required from each hospital. The investigator realized that some records would probably not be located at the time of the panel review for reasons which have no apparent relationship to the urgency of the patient (e.g., record misfiled, record temporarily unavailable because patient returned for cast change, follow-up, etc.). Accordingly, the sample size was increased by 10% to 275 to ensure that at least 250 patient charts would be reviewed by each hospital's panel (Figure 3.g; Figure 4.g).

No pretest was conducted at either hospital due to time constraints, although the investigator discussed the data collection method with staff members at both hospitals.

Only patients seen by emergency physicians were included (Figure 3.b; Figure 4.b). To include those seen by their own doctor would have meant notifying all attending staff and requesting their cooperation in familiarizing themselves with the urgency criteria so that they could assign an urgency rating to patients which they examined in the emergency department. Persons in charge of administrating the emergency department in each hospital stated that it would

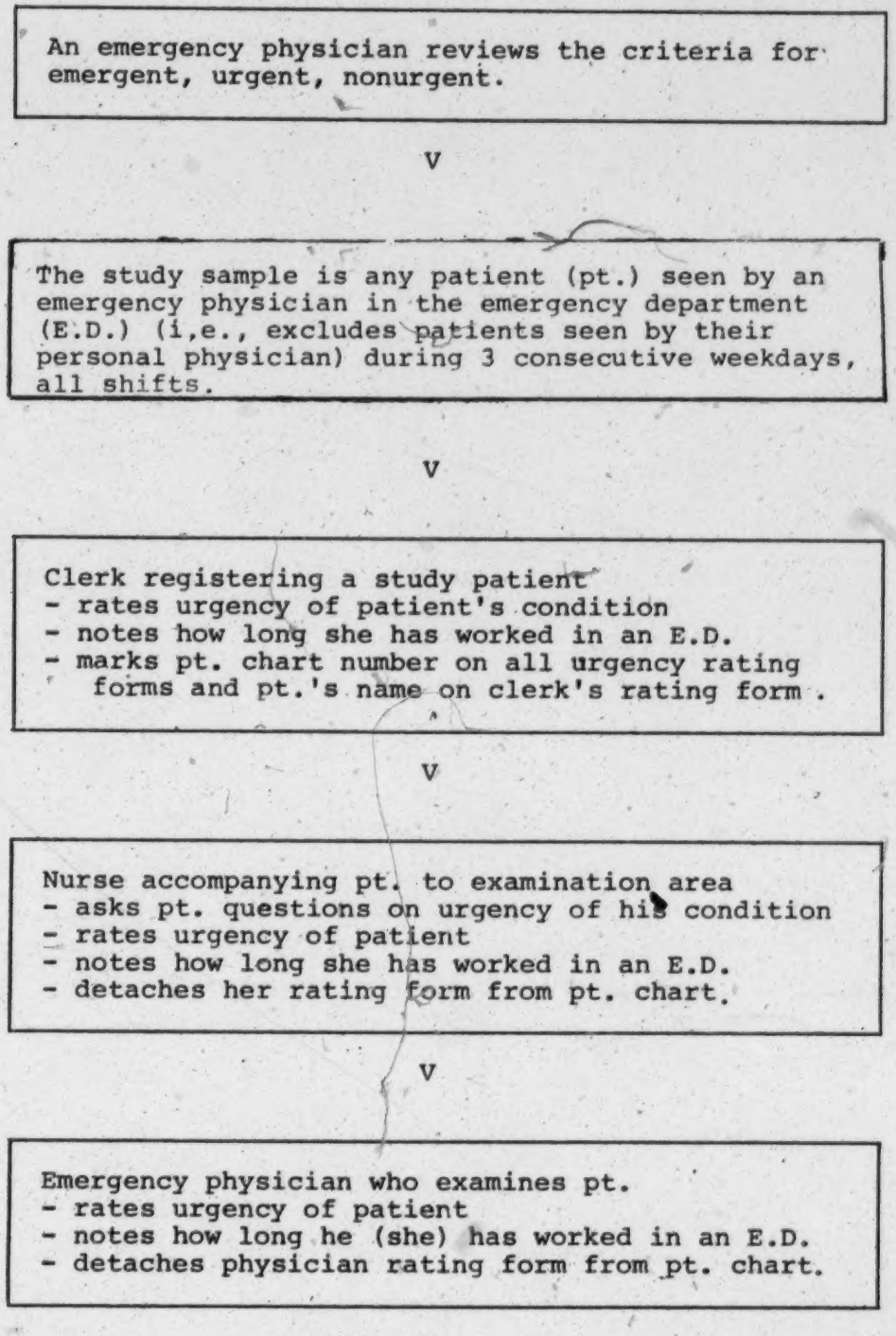
a
An emergency physician reviews the criteria for emergent, urgent, nonurgent.
V
b
The study sample is any patient (pt.) seen by an emergency physician in the emergency department (E.D.) (i,e., excludes patients seen by their personal physician) during 3 consecutive weekdays, all shifts.
V
c
Clerk registering a study patient
- rates urgency of patient's condition
- notes how long she has worked in an E.D.
- marks pt. chart number on all urgency rating forms and pt.'s name on clerk's rating form .
V
d
Nurse accompanying pt. to examination area
- asks pt. questions on urgency of his condition
- rates urgency of patient
- notes how long she has worked in an E.D.
- detaches her rating form from pt. chart.
V
e
Emergency physician who examines pt.
- rates urgency of patient
- notes how long he (she) has worked in an E.D.
- detaches physician rating form from pt. chart.
V

Figure 3: Modified design for hospital A

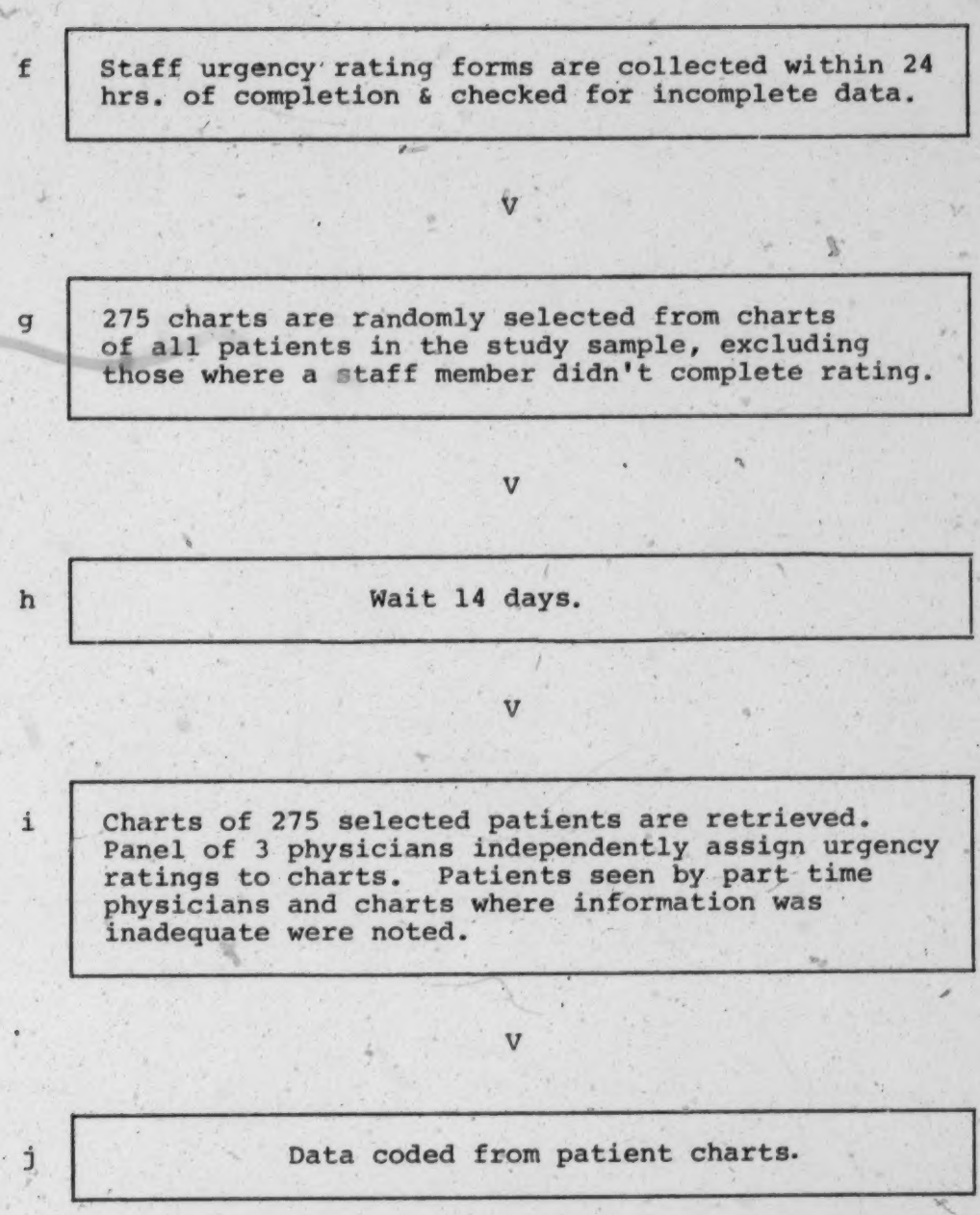
f
Staff urgency rating forms are collected within 24 hrs. of completion & checked for incomplete data.
V
g
275 charts are randomly selected from charts of all patients in the study sample, excluding those where a staff member didn't complete rating.
V
h
Wait 14 days.
V
i
Charts of 275 selected patients are retrieved. Panel of 3 physicians independently assign urgency ratings to charts. Patients seen by part time physicians and charts where information was inadequate were noted.
V
j
Data coded from patient charts.

Figure 3: Modified design for hospital A (continued)

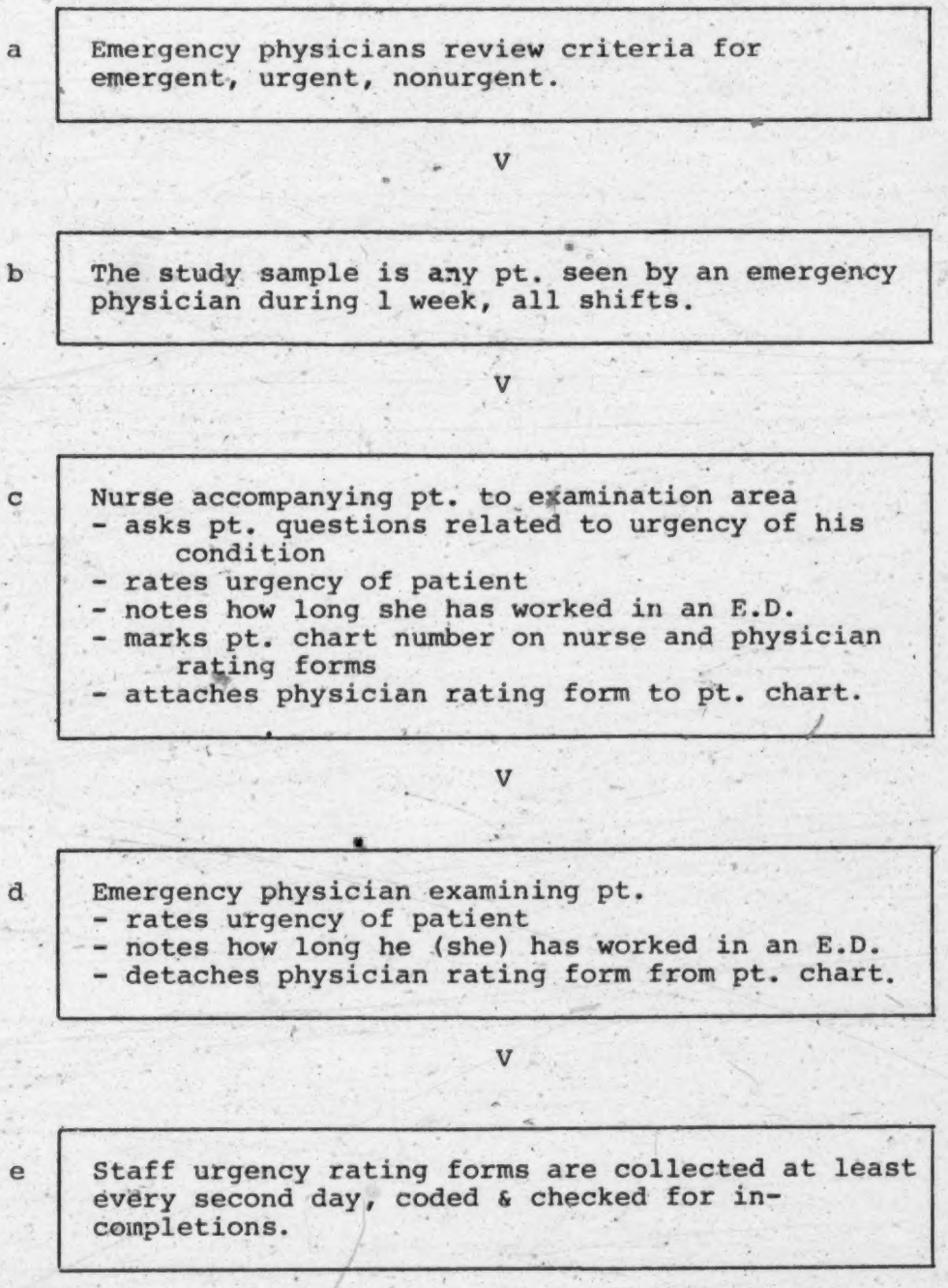
a
Emergency physicians review criteria for emergent, urgent, nonurgent.
V
b
The study sample is any pt. seen by an emergency physician during 1 week, all shifts.
V
c
Nurse accompanying pt. to examination area
- asks pt. questions related to urgency of his condition
- rates urgency of patient
- notes how long she has worked in an E.D.
- marks pt. chart number on nurse and physician rating forms
- attaches physician rating form to pt. chart.
V
d
Emergency physician examining pt.
- rates urgency of patient
- notes how long he (she) has worked in an E.D.
- detaches physician rating form from pt. chart.
V
e
Staff urgency rating forms are collected at least every second day, coded & checked for incompletions.

Figure 4: Modified design for hospital B

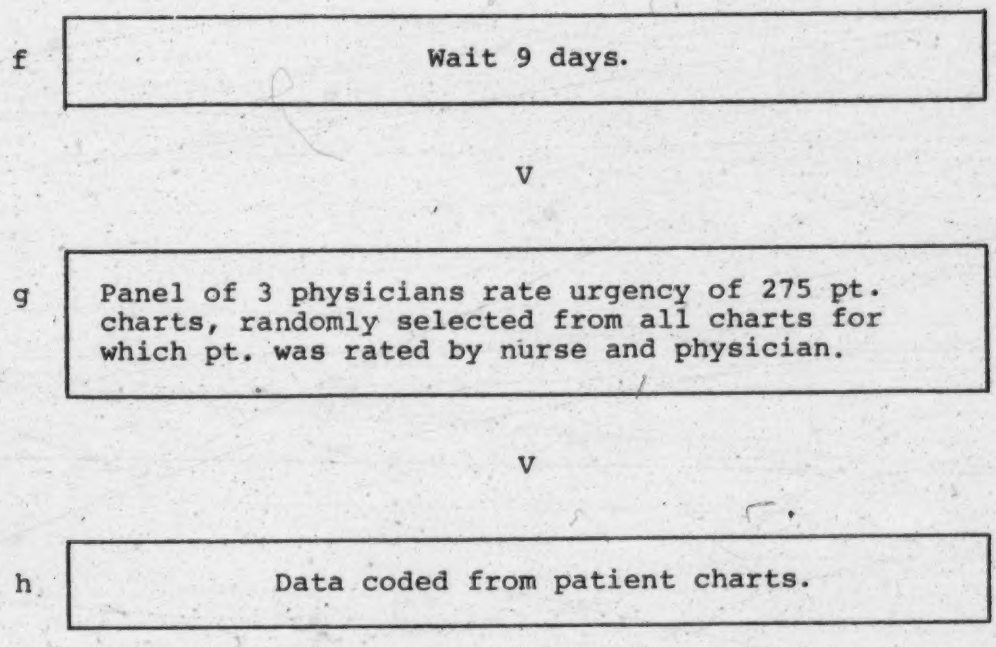
f
Wait 9 days.
V
g
Panel of 3 physicians rate urgency of 275 pt. charts, randomly selected from all charts for which pt. was rated by nurse and physician.
V
h
Data coded from patient charts.

Figure 4: Modified design for hospital B (continued)

be impossible to ensure the cooperation of these physicians.

This decision placed bounds on the physician population under study and created the potential for another type of missing data, namely, omissions due to the clerk's belief that the patient was to be seen by his own doctor when in fact an emergency physician cared for him.

After discussions with the staff of the emergency departments, it was realized that by randomly choosing time periods which were stratified by day of the week, time of day, and time of the year, the extent of missing data would be high since it was unreasonable to expect the staff, especially during busy periods, to commence and conclude the sampling during the exact times chosen. Furthermore, the persons in charge of the emergency departments of the two hospitals stated that it would be very difficult to maintain the interest and cooperation of all the emergency staff for even a one month period, let alone for a year.

A high rate of missing data would greatly decrease internal validity and "Internal validity is the basic minimum without which any experiment is uninterpretable (Campbell & Stanley, 1963, p. 5)." Consequently, external validity, or generalizability, was sacrificed to increase internal validity by choosing consecutive patients over the minimum time period necessary to include 275 patients in the sample. This decision increased the probability that the sample was not representative of the actual emergency

department caseload; on the other hand it also greatly increased the chances that the staff would adhere to and use the urgency criteria.

The patient load in hospital A was approximately twice that of hospital B. Consequently, the study ran for a full week in hospital A but only for 3 weekdays in hospital B (Figure 3.b; Figure 4.b). In both hospitals, all shifts were included during the data collection period.

Hospital A

Panel physician I in hospital A (cf. Ch. 2) was concerned that both full and part time emergency physicians completed the assessments. Since he believed there could be variations here, he noted which patients were seen by part-time physicians when he completed his assessments. In addition, all panel physicians (I, II, III) in this hospital indicated which patient charts they felt had insufficient information to allow them to be confident in their assessments. Both these items were added to the information coded by the investigator (Figure 3.i).

The patient questions provided as examples in the optimal design (cf. p. 26) were used as an indirect measure of the patient's perception of his urgency in this hospital (cf. Appendix B-2).

The patients' chart in hospital A did not include marital status information, although information was collected on whether or not the patient was a Workman's Compensation Board (WCB) case.

Hospital B

The registration clerk was not included in the study at this hospital because she was considered unqualified for such an assessment by those responsible for the service being rendered in the emergency department.

Patient question 2, cited on page 26, was not asked because persons providing care in this emergency department felt that this could have a negative affect upon public relations. Therefore, a question relating to physician contact prior to the emergency visit was substituted (Appendix B-3).

Summary

An optimal design for investigating the ability of emergency department staff to classify the urgency of patients' conditions should include: (1) a random selection of emergency departments from all emergency departments of interest; (2) the use of urgency criteria which have been accepted in the literature; (3) a review of these criteria by persons in the emergency departments being studied; (4) the selection of a minimum of 250 patients, randomized,

clustered, and stratified by appropriate variables over the time period of interest; (5) the independent assignment of urgency ratings by the patient and all staff members of interest; (6) the assignment of a "true urgency" rating to each selected patient, against which the accuracy of the staff and the patient will be judged; (7) the collection of data which may account for differences in the assignment of urgency ratings by the staff and patient; and (8) a pretest of the methods employed.

The investigator wished to study the accuracy of the clerk, nurse, and physician in assessing the urgency of patients entering Edmonton emergency departments during a one year period. The design actually employed in this study did not fulfill all the criteria required for an optimal design. The following deviations were necessary for implementation of the study: (1) two emergency departments were nonrandomly selected; (2) the sample for each hospital was consecutive patients seen by only emergency physicians, during no more than seven consecutive days in June 1973; (3) the clerk was not included in the study at one hospital; all three types of staff were included in the second hospital; and (4) the questions prepared to provide an indirect measure of the patient's perception of the urgency of his condition had to be modified for one of the hospitals.

An explanation of the results now follows.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION

Introduction

This chapter reports the findings of the implementation of the research design described in the preceding chapter. The results and interpretation of the data analysis is presented in the following order: (1) report of missing data, (2) analysis of urgency ratings assigned by the panel physicians, (3) analysis of the urgency ratings assinged by each type of staff, (4) effect of experience on the ability of staff to rate the urgency of patients, (5) the patient's perception of his urgency, and (6) other factors influencing the accuracy of the staff urgency ratings.

Report of Missing Data

Although steps were taken to eliminate sources of missing data wherever possible (cf. p. 30-35), this problem was not entirely overcome. Table 1 summarizes the extent of incomplete data collection in both hospitals.

During the data collection period at least 401 patients from hospital A and 464 patients from hospital B

TABLE 1

EXTENT OF INCOMPLETE DATA COLLECTION

	Hospital A	Hospital B
i - Minimum number of patients seen by emergency physicians during data collection period.	401 (100%)	464 (100%)
ii - Total number of patients assessed by a clerk, and/or a nurse, and/or an emergency physician.	401 (100%)	431 (93%)
iii - Number of patients given a rating by both physician and nurse	359 (90%)	368 (79%)
iv - Number of records randomly selected from iii for review by the panel.	275 (69%)	275 (59%)
v - Number of records assessed by all 3 panel physicians (i.e., iv less those charts that could not be located at the time of the review).	252 (63%)	266 (57%)
vi - Number of records investigator was able to assign a "true urgency" rating (cf. pp.43-44).	250 (62%)	265 (57%)
vii - Number of records rated by the clerk which had been given a "true urgency" rating	249 (62%)	

(Table 1.i) were seen by emergency physicians. The investigator had no way of accurately determining the exact number of patients seen by emergency physicians during the study period. In hospital A, the charts of patients seen during the study period were filed with those of previous months. Thus it was virtually impossible to determine how many patients were seen by an emergency physician during the study period, but were not assigned ratings by any staff member. This number was not believed to be large since extra clerical support was available to ensure that the urgency rating forms were attached to the charts of all patients who were to be seen by an emergency physician. On the other hand, the emergency department of hospital B was understaffed on days 5 and 6 of the study. Consequently, the staff was unable to formulate urgency assessments for some patients. There were also short periods of time during other study days when the staff were very busy and did not have time to assign ratings. During the study in hospital B, the charts of all patients seen in this emergency department were filed separately from the rest of the 1973 patient charts. By reviewing the charts of all patients seen during the study week, the investigator was able to identify 33 patients that were seen by an emergency physician but not rated by the staff. Thus, at least seven percent of the patients selected for this study were not rated by the staff (Table 1.ii). These patients did not appear to differ from

the study patients in the type of illness or injury which brought them to the emergency department, but many of them were seen by more than one doctor due to a shift change, or the need for consultation. A few of these patients were seen by both the emergency physician and their own doctor.

Since the staff in both hospitals were very busy during the study, there were times when the nurse or doctor did not complete the appropriate rating form. For this reason, 42 cases (10%) were incomplete in hospital A and 63 cases (14%) in hospital B. These patients did not appear to differ in the type of illness or injury from those assessed by all types of staff. Some of these cases were patients who were seen by their own doctor but the staff member attaching the forms believed they were to be seen by an emergency physician.

The number of patients rated by the three types of staff in each hospital was considerably greater than 275 (the number of patient charts the panel had agreed to review for this study). Therefore, the number of charts selected for review by the panel was reduced to 275 by random sampling (Table 1.iv).

Some records could not be located at the time of the panel review. In hospital A, the charts of the patients rated by the staff were retrieved by patient name from the charts of all patients seen in previous months. The

investigator was unable to locate 23 of the 275 charts since some patient names were not written clearly on the clerk's rating form (Appendix B-1), and the investigator believes that some charts may have been misfiled. Therefore only 252 charts were reviewed by the panel in hospital A (Table 1 v).

By the time of the panel review in hospital B, four records for the last study day had not been filed with the records for the study week. The investigator could not locate another five records for patients seen during the other study days. Consequently, only 266 of the 275 randomly selected records were reviewed by the panel. Only record numbers (not patient names) were recorded during the study in this hospital. Therefore, the investigator could not determine if these records had accidently been filed with the rest of the 1973 records. No other reason is apparent for not being able to locate these records, since any records removed from the charts of the patients seen during the study week were signed out so that they could be located at the time of the panel review.

In each hospital, there was one patient for which each of the three panel members assigned a different urgency rating. In hospital A, the patient complained of chest pain but the cause could not be determined at the time of the visit. In hospital B, the patient had taken an overdose of

methylenedioxy amphetamine (MDA) and valium. Since these two patients could not be assigned a "true urgency" rating (i.e., a rating assigned by at least two panel physicians), they were omitted from the analysis. Another patient from hospital A was also omitted since he was only rated by two of the three panel physicians. Although the other two physicians rated this patient as urgent, the investigator believed that if any physician declined to rate a patient because of insufficient information, the validity of the rating would be in doubt and thus should not be declared the "true urgency" against which the accuracy of staff members was to be judged. There were no cases where two physicians listed a case as (1) nonurgent and the third physician placed him in the emergent category, or (2) emergent and the third physician placed him in the nonurgent category.

The sample sizes used in reporting the accuracy of the nurse and emergency physician are 250 for hospital A and 265 for hospital B (Table 1.vi). The sample size employed in reporting the accuracy of the clerk in hospital A was 249 (Table 1. vii) since one patient, who was rated by the nurse and emergency physician, was not rated by the clerk.

Analysis of Urgency Ratings Assigned by the Panel Physicians

"True urgency" ratings were formulated from the "panel" physician ratings (cf. p. 28). The validity of these ratings is unknown, but theoretically cannot be greater than the reliability of these ratings. Reliability estimates

between panel physicians are included in Table 2. Kendall correlation coefficients between pairs of panel physicians in each hospital ranged from 0.449 to 0.666. Corresponding percentages of agreement ranged from 65% to 82%. A breakdown of the percentages of agreement (Table 3) shows that only one patient in each hospital was assigned an "emergent" rating by all three physicians. Slightly more than a quarter of the patients were classified as "urgent" by all panel members (33.1% in hospital A, 27.5% in hospital B.) Approximately another quarter were labelled "nonurgent" by all three panel physicians (25.9% in hospital A, 22.3% in hospital B). The three physicians did not agree unanimously in over 40% of the ratings (40.2% for hospital A, 49.8% for hospital B).

Since unanimity amongst panel members was lacking in over 40% of the cases, serious doubts are raised as to the validity of using the review of records by a single physician as an accurate measure of patient urgency, both in this study and in studies by other investigators (cf. p. 12). To investigate the extent of the discrepancies amongst the panel physicians, Friedman's two-way analysis of variance by ranks (Siegal, 1956, pp. 166-172) was carried out to test the null hypothesis that there was no significant difference between the ratings of the panel physicians. The chi square values obtained had probabilities less than 0.001 (chi square for hosptial A was 67.8, df=2; for hospital B was 35.19, df=2).

TABLE 2

PERCENTAGES OF AGREEMENT AND KENDALL CORRELATION COEFFICIENTS FOR URGENCY RATINGS ASSIGNED BY THE STAFF AND PANEL*

Hospital A (N=250°)

	Clerk	Nurse	Doctor	I	II	III	True urgency
Clerk	1.000	64%	57%	61%	59%	62%	62%
Nurse	0.443	1.000	73%	72%	63%	64%	70%
Doctor	0.351	0.527	1.000	71%	71%	62%	70%
I	0.423	0.501	0.501	1.000	82%	73%	95%**
II	0.387	0.342	0.505	0.666	1.000	65%	87%**
III	0.376	0.441	0.494	0.593	0.465	1.000	78%**
True Urgency	0.434	0.463	0.494	0.910**	0.770**	0.659**	1.000

Note.- Percentages of agreement values are above the diagonal and Kendall correlation coefficients below. Kendall correlation coefficients have smaller absolute values (by approximately 0.01 in these tables) than Spearman rho correlation coefficients. The two coefficients provide identical information, except that Kendall's tau tends to be more meaningful when many tied ranks are present in the data (Blalock, 1972, p. 421).

* Roman numerals I, II, and III denote the three panel physicians in hospital A, while IV, V, and VI indicate the panel physicians in hospital B.

° Except where the measures of agreement include the clerk's ratings, in which case N = 249.

** These values are inflated since they are relationships between a panel physician's rating and a panel composite score.

TABLE 2

(CONTINUED)

PERCENTAGES OF AGREEMENT AND KENDALL CORRELATION COEFFICIENTS FOR URGENCY RATINGS ASSIGNED BY THE STAFF AND PANEL*

Hospital B (N=265)

	Clerk	Nurse	Doctor	IV	V	VI	True urgency
Nurse	-----	1.000	69%	66%	64%	64%	66%
Doctor	-----	0.448	1.000	66%	59%	70%	66%
IV	-----	0.387	0.363	1.000	67%	67%	84%**
V	-----	0.372	0.335	0.449	1.000	66%	79%**
VI	-----	0.328	0.418	0.487	0.547	1.000	84%**
True urgency	-----	0.350	0.403	0.707**	0.706**	0.712**	1.000

* Roman numerals I, II, and III denote the three panel physicians in hospital A, while IV, V, and VI indicate the panel physicians in hospital B.

** These values are inflated since they are relationships between a panel physician's rating and a panel composite score.

TABLE 3

FREQUENCY OF VARIOUS COMBINATIONS OF PANEL PHYSICIAN URGENCY RATINGS

	Hospital A	Hospital B	True urgency
emergent, emergent, emergent	1 (0.4%)*	1 (0.4%)*	emergent
emergent, emergent, urgent	3 (1.2%)	3 (1.1%)	emergent
emergent, urgent, urgent	11 (4.4%)	3 (1.1%)	urgent
urgent, urgent, urgent	83 (33.1%)*	73 (27.5%)*	urgent
urgent, urgent, nonurgent	39 (15.5%)	58 (21.9%)	urgent
urgent, nonurgent, nonurgent	48 (19.1%)	68 (25.7%)	nonurgent
nonurgent, nonurgent, nonurgent	65 (25.9%)*	59 (22.3%)*	nonurgent
Total	250 (100.0%)	265 (100.0%)	

* The sum of these values for each hospital (59.8% for hospital A; 50.2% for hospital B) is the proportion of cases where all three panel physicians were in agreement.

Therefore, one would reject the null hypthesis, i.e., there were significant differences between panel physicians. Consequently, for purposes of this study, the urgency rating given by at least two of the panel physicians was coded as the "true urgency" for each patient. While this "true urgency" rating contains an unknown error component, it was considered the best estimate of the actual urgency of the patient's condition available to the investigator. (Recall that only one patient in each hospital was assigned different ratings by all three panel physicians; these two patients were omitted from this analysis (cf. p. 44).)

Analysis of Urgency Ratings Assigned by the Staff

For the discussion and tables in this chapter, "clerk" refers to all clerical personnel registering patients in the emergency department being considered, "nurse" to all nurses providing nursing care in the emergency department of hospital A or B, and "doctor" to the full and part-time emergency physicians responsible for medical coverage of the emergency department under study. "Staff" is used to include only these three types of personnel.

The Kendall correlation coefficients and percentages of agreement between the staff urgency ratings and the "true urgency" ratings are provided in Table 2. The range in correlation coefficients was from 0.350 to 0.494. While none of the correlation coefficients between the staff and

"true urgency" ratings can be considered high, they are all statistically significant under the hypothesis that tau equals zero.

The percentages of agreement between the assessments of the three types of staff and the "true urgency" ratings (Table 2) show that the nurse and the doctor were equally capable. Both classified 70% of the patients correctly in hospital A and 66% in hospital B. The clerk's rating agreed with the "true urgency" ratings 62% of the time. Using a two-tailed proportions test with a level of significance of 0.05, the clerk was found to be significantly less accurate than the doctor ($z = 1.99$, $p < 0.05$) but not significantly less accurate than the nurse ($z = 1.95$, $p > 0.05$). Note that both z values were close to the critical z value of 1.96. The differences arose from the disparity in the nurse and physician ratings before rounding (nurse = 69.6%, doctor = 70.4%).

As stated previously (cf. p. 49), the panel members did not agree unanimously on the urgency ratings for over 40% of the patients. Consequently, the number of times the ratings agreed with at least one of the panel physicians is also provided (Table 4). The physician's agreement was only marginally greater than the nurse's agreement. The nurse in hospital A agreed with at least one of the panel physicians 85.6% of the time, while the doctor was in agreement 86.8%

TABLE 4

NUMBER OF CASES WHERE THE STAFF RATINGS AGREED WITH AT LEAST ONE OF THE PANEL RATINGS

	Hospital A	Hospital B
Clerk	200 (80.3%) (N = 249)	———
Nurse	214 (85.6%) (N = 250)	234 (88.3%) (N = 265)
Doctor	217 (86.8%) (N = 250)	237 (89.4%) (N = 265)

of the time. In hospital B, these values were 88.3% for the nurse and 89.4% for the doctor. In hospital A, the clerk's agreement (80.3%) was significantly lower than the nurse ($z = 2.00$, $p < 0.05$) and the doctor ($z = 2.27$, $p < 0.05$).

The chi square goodness of fit test (Ferguson, 1971, pp. 171-182) was used to determine which staff members were most accurate in estimating the proportions of patients falling into the nonurgent, urgent, and emergent categories. (Criterion for these "true urgency" categories is given in Table 3.) Table 5 includes the results of this test, and the percentage of patients rated as "emergent", "urgent", and "nonurgent" by each staff member and panel physician. Using a level of significance of 0.05, one would conclude that the clerk, the emergency physician in both hospitals, and panel physicians III, V, and VI did not accurately estimate the "true" proportion of patients in each urgency category. Since three of the six panel physicians are assumed to be unable to make such an estimate, one must question (1) the reported proportions of "true" emergent, urgent, and nonurgent patients in this study (cf. Table 5 "True urgency"), and in other studies (cf. p. 12), and/or (2) the advisability of using a review of patient records for establishing "true urgency", and/or (3) the criteria establishing "true urgency" (i.e., rating agreed upon by at least two physicians, definitions and examples of emergent, urgent, and nonurgent (Appendix A)).

TABLE 5

PERCENT EMERGENT, URGENT, AND NONURGENT BY PERSON MAKING ASSESSMENT AND TEST FOR CHI SQUARE GOODNESS OF FIT

	Emergent	Urgent	Nonurgent	χ^2 Test for Goodness of Fit* (df=2)
Hospital A				
Clerk	24 (9.6%)	140 (56.2%)	85 (34.2%)	104.52
Nurse	7 (2.8%)	120 (48.0%)	123 (49.2%)	3.79
Doctor	10 (4.0%)	126 (50.4%)	114 (45.6%)	8.00
I	4 (1.6%)	126 (50.4%)	120 (48.0%)	1.22
II	2 (0.8%)	119 (47.6%)	129 (51.6%)	5.26
III	14 (5.6%)	157 (62.8%)	79 (31.6%)	58.67
True urgency	4 (1.6%)	134 (53.6%)	112 (44.8%)	
Hospital B				
Nurse	6 (2.3%)	131 (49.4%)	128 (48.3%)	1.08
Doctor	5 (1.9%)	109 (41.1%)	151 (57.0%)	8.37
IV	3 (1.1%)	142 (53.6%)	120 (45.3%)	1.11
V	6 (2.6%)	170 (63.9%)	89 (33.5%)	22.04
VI	3 (1.1%)	100 (37.8%)	162 (61.1%)	18.53
True urgency	4 (1.5%)	134 (50.6%)	127 (47.9%)	

* The chi square goodness of fit test (Ferguson, 1971, p. 177-182) was used to compare the number of patients that the staff and panel placed in each urgency group to the number of patients in each group of the "true urgency" rating. Underlined values are those where the number of patients placed in each group was not related to the final urgency distribution, when the level of significance is set at 0.05.

With these cautions in mind, the results of Table 5 will now be discussed. In both hospitals, the nurse assigned the same proportion of patients, but not necessarily the same patients to each urgency category as found in the "true urgency" groups (hospital A, chi square = 3.79, df = 2, $p > 0.05$; hospital B, chi square = 1.08, df = 2, $p > 0.05$). The emergency physician did not assign the same proportions as the "true urgency" ratings (hospital A, chi square = 8.00, df = 2, $p < 0.05$; hospital B. chi square = 8.37, df = 2, $p < 0.05$).

The registration clerk did not include the same proportion of patients in each urgency category as given in the "true urgency" rating (chi square = 104.52, df = 2, $p < 0.05$). She tended to view the patients as more urgent than reported by the "true urgency" ratings (Table 6). This conservative approach may have merit in a triage situation but must be weighted against the decreased effectiveness of a triage system in which the nurse would be responsible for streaming.

Table 7 provides further evidence that the clerk tended to be more conservative in her assessments of urgency. She was the only staff member, in either hospital, to label "emergent" all four patients whose "true urgency" was emergent. Also, the clerk had almost 10% fewer correct nonurgent ratings than the other staff members in both hospitals.

TABLE 6

CASES OF DISAGREEMENT BETWEEN STAFF AND TRUE URGENCY ASSESSMENTS

	Assessed higher than panel	Assessed lower than panel*	Classified incorrectly
Hospital A			
Clerk	70 (28.1%)	24 (9.6%)	94 (37.7%)
Nurse	34 (13.6%)	42 (16.8%)	76 (30.4%)
Doctor	39 (15.6%)	35 (14.0%)	74 (29.6%)
Hospital B			
Nurse	44 (16.6%)	46 (17.3%)	90 (33.9%)
Doctor	33 (12.4%)	56 (21.1%)	89 (33.5%)

* No staff member ever classified a patient as nonurgent that the panel later listed as emergent.

TABLE 7

CASES OF AGREEMENT BETWEEN STAFF AND TRUE URGENCY ASSESSMENTS FOR THE THREE URGENCY CATEGORIES

	Emergent	Urgent	Nonurgent	Classified correctly
Hospital A				
Clerk	4 (1.6%)	90 (36.1%)	61 (24.5%)	155 (62.2%)
Nurse	2 (0.8%)	89 (35.6%)	83 (33.2%)	174 (69.6%)
Doctor	2 (0.8%)	93 (37.2%)	81 (32.4%)	176 (70.4%)
Hospital B				
Nurse	1 (0.4%)	89 (33.6%)	85 (32.1%)	175 (66.1%)
Doctor	1 (0.4%)	77 (29.1%)	98 (37.0%)	176 (66.5%)

Note.- Denominator of percentages is the number of cases assessed by each staff member.

The dependent proportions test (Ferguson, 1971, pp. 162-164) was used to determine if there was a significant difference between types of staff in terms of the tendency to assess patients in a category of greater urgency than the panel's "true urgency" rating (i.e., staff ratings were dichotomized into (1) ratings of greater urgency than the "true urgency" assessment, or (2) ratings the same as or of lesser urgency than the "true urgency" ratings). No statistically significant difference was observed when the nurse and physician in hospital A were compared ($z = 0.74$, $p > 0.05$). However, the clerk classified significantly more patients in categories of greater urgency than the nurse ($z = 4.78$, $p < 0.05$) or the doctor ($z = 3.68$, $p < 0.05$). Cases of incorrect assessment (Table 6) were investigated further to identify cases of extreme divergence of opinion between staff and "true urgency" ratings (i.e., nonurgent and emergent differences). In this study, no staff member ever classified a "true emergent" as nonurgent. The nurse in hospital B rated three "nonurgent" patients as emergent, and the clerk in hospital A rated one "nonurgent" patient as emergent. No other extreme incorrect classifications were made in either hospital.

The differences between staff members in ability to assess urgency can be summarized as follows. A statistically significant relationship exists between the ratings of all three types of staff and the "true urgency" ratings. No differences in percentages of agreement were found between the nurse and emergency physician in either hospital. It is left to the discretion of the reader to decide whether the

percentage of agreement between the clerk and "true urgency" ratings was meaningfully lower than that for the nurse and emergency physician. The percentages of agreement between the ratings given by each type of staff and at least one panel physician showed that, statistically, the clerk was less accurate than the nurse and doctor. Therefore, this study demonstrated no statistical difference between the nurse and doctor in ability to classify patients. The ability of the clerk approached that of the health professionals, although she was more conservative in her assessments of urgency.

The decision on which staff member(s), if any, have sufficient accuracy to be responsible for classifying patients, is not answered since additional criteria is needed to determine such an answer.

Effect of Experience on Ability of Staff to Rate Urgency

The purpose of this study was to examine the effect of training and experience on the ability of emergency department staff to clsssify the urgency of patients (cf. p. 1). A report of the effect of training was just provided. Now the relationship observed between staff experience and ability to classify patients will be discussed.

From the data collected in this study, experience did not appear to account for differences in the ability to assess urgency. The urgency ratings assigned by the staff in each of four experience categories (cf. p. 24) were compared using Kendall's tau (Table 8). When these

TABLE 8

MEASURES OF ACCURACY BETWEEN THE VARIOUS STAFF EXPERIENCE COMBINATIONS AND THE TRUE URGENCY RATINGS FOR HOSPITALS A AND B COMBINED

	< 3 mo.	3 mo.-1 yr.	1-2 yr.	2 or more yr.
KENDALL CORRELATION COEFFICIENTS				
Clerk (N=249)	0.244 (N=53)	0.596 (N=61)	0.630 (N=11)	0.426 (N=116)
Nurse (N=515)	0.365 (N=56)	0.503 (N=45)	0.167 (N=71)	0.460 (N=335)
Doctor (N=515)	0.514 (N=17)	0.419 (N=85)	0.562 (N=237)	0.278 (N=171)
PERCENTAGES OF ACCURATE ASSESSMENTS				
Clerk	59%	69%	55%	69%
Nurse	66%	71%	56%	70%
Doctor	77%	66%	50%	60%
CHI SQUARE GOODNESS OF FIT				
Clerk	0.08	16.90	1.14	116.30
Nurse	9.64	4.02	10.03	2.65
Doctor	0.00	2.54	8.17	3.64

Note.- All correlations are significant at the 0.05 alpha level.

Note.- The N's for the percentage of agreement and chi square tabulations were the same as those specified in the respective cells of the correlation calculations.

correlations were ranked and compared to the length of experience rank values using Spearman's rho correlation coefficients (Blalock, 1972, pp. 416-418), experience was found to be not significantly related (alpha = 0.05) to the ability to classify the urgency of patients (clerk, rho = 0.80, p = 0.095; nurse, rho = 0.40, p = 0.245; doctor, rho = 0.40, p = 0.245). The percentages of accurate assignments and the chi square goodness of fit test to the "true urgency" ratings support the conclusion that no relationship was evident between the ability to classify patients and experience.

Factors other than experience, or in combination with experience, may account for differences in the ability of staff members to assess urgency, but the results of this study do not support the hypothesis that experience in an emergency department alone influences accuracy. It is possible that the operational definition of experience in this study was not the most appropriate one that could have been employed. Beloff (1968) contends that triage officers should be "... experienced in dealing with patients ... [p. 68]", and thus does not limit experience to that obtained in an emergency department.

Another possible source of error is that staff who were experienced in the emergency area and capable of accurately classifying patients might not have been motivated

to conscientiously apply the urgency criteria prepared for this study. Other characteristics cited in the literature such as maturity (Beloff, 1968, p. 68), responsibility (Taubenhaus & Simon, 1973, p. 43), and interest (Beloff, 1968, p. 69) may be responsible for variations in ability to assess urgency.

Some of the emergency physicians were only working part-time in the emergency department. Therefore, their emergency department experience was not as extensive as that for full-time physicians with a comparable length of experience. Also, those working part-time may not have had the same degree of interest in their work as those working full-time. Consequently, an attempt was made to determine if there was a difference between full and part-time physicians in ability to assess urgency. In hospital A panel physician I noted which patients had been seen by part-time emergency physicians when he completed his urgency ratings (cf. p. 36). Using this information, a comparison was made between the abilities of full and part-time emergency physicians in hospital A. The ratings of the full-time emergency physicians agreed with the "true urgency" ratings 71.7% of the time (N = 184), while the part-time physicians agreed with the "true urgency" ratings 66.6% of the time (N = 66). This difference was not significant at an alph level of 0.05 when the independent proportions test (Ferguson, 1971, pp.

160-162) was used ($z = 1.19$, $p > 0.05$). Thus, in this study, no relationship was observed between ability to classify urgency and (1) length of experience in an emergency department, or (2) whether the physician was working full or part time in the emergency department.

Patient's Perception of Urgency

In examining who was capable of assessing urgency, the investigator considered it expedient to include the perceptions of the patient himself (cf. p. 15). Therefore, the nurse asked the patient questions (Appendices B-2 & B-3) dealing with specific urgency criteria. From these questions an indirect measure of the patient's perception of his urgency was obtained.

Seven patients from hospital A and four patients from hospital B did not answer one or both of the patient questions. Five of these patients were nonurgent and the rest urgent. Where the chi square test of independence was used to analyse contingency tables, the emergent and urgent categories were collapsed into one category to eliminate small or zero cell sizes.

Who Answered the Questions

The nurse was asked to indicate whether the patient answered these questions himself or someone accompanying the patient answered them. In each hospital, approximately 30%

of the responses were made by the patient's companion. Despite this, no significant relationship existed between who answered the questions and the urgency of the patient (hospital A, chi square = 0.02, df = 1, $p > 0.05$; hospital B, chi square = 0.00, df = 1, $p > 0.05$).

However, the question of who responded - the patient or his companion - was significantly dependent upon the age of the patient. Pediatric patients (less than 16 years) were more likely to have their companion answer the questions (chi square = 233.33, df = 1, $p < 0.05$). However, when "who answered" was compared to the urgency of the patient, controlling for age, still no significant differences were found at the 0.05 level (adult, chi square = 2.32, df = 1; child, chi square = 2.29, df = 1). Caution must be exercised in attempting to draw conclusions from this information since observations were missing for 65 (19%) of the 336 adult cases.

Length of Time Aware of Problem

A significant relationship was observed between the patient's "true urgency" and the length of time the patient reported that he had been aware of his medical problem. Table 9 reports these findings. This was not unexpected since one of the criteria for nonurgency was that the patient had his condition for 24 hours or more (Appendix A). Due to this fact, correlations larger than those found (hospital A, Kendall's tau = 0.353; hospital B, tau = 0.321) would not have been unreasonable.

TABLE 9

LENGTH OF TIME PATIENT HAS BEEN AWARE OF PROBLEM BY TRUE URGENCY RATING

	Emergent	Urgent	Nonurgent	Totals
Hospital A				
< 3 hours	3 (2.2%) (75.0%)	93 (68.4%) (69.9%)	40 (29.4%) (35.7%)	136
6-24 hours	0 (0.0%) (0.0%)	21 (56.8%) (15.8%)	16 (43.2%) (14.3%)	37
1-7 days	1 (2.0%) (25.0%)	13 (26.0%) (9.8%)	36 (72.0%) (32.1%)	50
> week	0 (0.0%) (0.0%)	6 (23.1%) (4.5%)	20 (76.9%) (17.9%)	26
Totals	4	133	112	249
Hospital B				
< 3 hours	3 (1.9%) (75.0%)	102 (63.0%) (76.1%)	57 (35.2%) (44.9%)	162
6-24 hours	1 (2.3%) (25.0%)	19 (43.2%) (14.2%)	24 (54.5%) (18.9%)	44
1-7 days	0 (0.0%) (0.0%)	10 (21.7%) (7.5%)	36 (78.3%) (28.3%)	46
> week	0 (0.0%) (0.0%)	3 (23.1%) (2.2%)	10 (76.9%) (7.9%)	13
Totals	4	134	127	265

Note.- Chi square is 38.8, df = 3, $p < 0.001$ when the emergent and urgent categories are combined.

Note.- Row percentages are given to the right of the cell sizes. Beneath the row percentages are column percentages.

Medical Facility Required: Hospital A

In hospital A only, patients were asked whether they thought they might have to stay in hospital (cf. p.37). If they responded negatively, they were asked whether an appointment with a doctor of their choosing within the next three days would have been as convenient. Table 10 summarizes the relationship between their responses and "true urgency". A relationship existed (Kendall's tau = 0.366, $p<0.05$) between the patients' answers to these questions and their "true urgency". The corresponding percentage of agreement between the patient responses and the "true urgency" ratings was 61%, (i.e. sum of diagonal percentages in Table 10), which is within the range of the staff percentages of agreement with the "true urgency" ratings in hospital A. Therefore, these questions might be valuable as one component in a triage system.

Composite Patient Urgency Rating: Hospital A

In hospital A, both the length of time the patient had been aware of his problem and the type of facility he believed he required correlated with the "true urgency" ratings better than they correlated with each other (Table 11). Therefore, these two variables ("time aware" and "facility required") were combined to form a "composite patient urgency rating" (cf. p. 26). These criteria class

TABLE 10

HOSPITAL A: PATIENT'S PERCEPTION OF MEDICAL FACILITY REQUIRED BY TRUE URGENCY RATING

	Pt. thinks he may have to stay in hospital	Dr.'s appt. in next 3 days is not convenient	Dr.'s appt. in next 3 days is as convenient	Totals
Emergent	4 (1.6%)	1 (0.4%)	0 (0.0%)	5 (2.0%)
Urgent	20 (8.0%)	98 (39.4%)	15 (6.0%)	133 (53.4%)
Nonurgent	6 (2.4%)	56 (22.5%)	49 (19.7%)	111 (44.6%)
Totals	30 (12.0%)	155 (62.3%)	64 (25.7%)	249 (100.0%)

Note.- The total percentage of agreement between these patient assessments and the "true urgency" ratings is 6.1% (i.e., sum of diagonal percentages). Kendall's tau between these ratings is 0.366.

TABLE 11

HOSPITAL A: AGREEMENT BETWEEN THE PATIENT URGENCY VARIABLES AND TRUE URGENCY RATING

	Length of time with problem	Facility required	Composite patient urgency	True urgency
Length of time with problem	1.000	***	***	***
Facility required	0.236 (N = 272)	1.000	87%	62%
Composite patient urgency	0.503 (N = 270)	0.812 (N = 266)	1.000	68%
True urgency	0.353 (N = 249)	0.366 (N = 249)	0.473 (N = 247)	1.000

*** Percentages of agreement could not be obtained because one variable had three values and the other had four values.

the patient as "emergent" if he has had his problem for less than 24 hours and thinks he may have to stay in hospital, and as "nonurgent" if an appointment in a doctor's office would have been as convenient for him or if such an appointment was not as convenient but he had his problem for more than 24 hours. Other possible responses were coded as "urgent".

The correlation between this indirect patient urgency rating and the "true urgency" rating was 0.473, with a corresponding percentage of agreement of 68%. This percentage is within the 95% confidence bounds of the percentages of agreement between the staff and "true urgency" ratings for hospital A (58.1%- 76.6%). Thus, it appears that patient self classification, employing predetermined criteria, can be as accurate as staff classifications of urgency. Before self triage is taken more seriously though, two questions must be answered: (1) what is the largest tolerable amount of error acceptable in any triage system, and (2) will the implementation of a triage system alter the accuracy of the staff's and/or patient's perceptions? Only evaluation after implementation can answer the latter question.

A note of caution must be included at this point concerning the extent of the accuracy of the patient responses. Nurses asked the patients the self triage

questions and recorded the patient responses. The nurses were not trained interviewers and thus the responses may not have been entirely objective. Since the agreement between patient and nurse (Kendall correlation coefficient is 0.538) is higher than between the patient and the "true urgency" rating (0.473) and between the nurse and "true urgency" rating (0.463), such a source of invalidity should not be overlooked.

Physician Contacted Prior to Visit: Hospital B

In hospital B, the patient response to the questions relating to the facilities he felt he required were replaced by questions on the patient's attempt to contact a doctor before coming to the emergency department (cf. p. 37). Eleven percent of the patients reported contacting a doctor but no significant relationship was found between the patient's urgency and whether he contacted a doctor prior to visiting the emergency department (Table 12, chi square = 0.00, probability >0.90). Other studies (Bain & Johnson, 1971, p. 36; Weinerman, Ratner, Robbins, & Lavenhar, 1966, p. 1050; Vayda, Gent, & Paisley, 1972, p. 13) have reported that physicians appear to act as a screen by discouraging patients with nonurgent conditions from visiting the emergency department. This does not appear to be the case for hospital B.

TABLE 12

HOSPITAL B: PATIENT'S ATTEMPT TO CONTACT A DOCTOR BEFORE COMING TO THE EMERGENCY DEPARTMENT BY TRUE URGENCY RATING

	Tried to contact doctor	Did not try to contact doctor
Emergent	1 (3.6%) (25.0%) (0.4%)	3 (1.3%) (75.0%) 1.2%)
Urgent	13 (46.4%) (9.8%) (5.0%)	119 (51.1%) (90.2%) (45.6%)
Nonurgent	14 (50.0%) (11.2%) (5.4%)	111 (47.6%) (88.8%) (42.5%)
Total	28	233

Note.- Percentages are by column, row and total respectively.

Note.- Test of significance between proportion (Ferguson, 1971, p. 160-162) of nonurgent patients in each group was not significant. z is 0.49 ($p > 0.05$).

Summary of Patient's Perception of Urgency

If patient self triage is considered, guidelines for the patient's decision must be formulated. Two questions which, in combination with others, might be useful as screening questions are: "How long have you been aware of the medical problem which brought you to the emergency department today?" and "Do you think that you might have to stay in hospital? If not, would an appointment in a doctor's office be as convenient for you?" Questions of prior physician contact and the need for the person accompanying the patient to answer for the patient do not appear to be useful criteria.

Factors Influencing the Accuracy of the Urgency Ratings

To repeat, caution must be exercised in interpreting the preceding reported measures of agreement since: (1) the error component of the "true urgency" ratings is not definitive, and (2) the ability of the staff to assess urgency may be dependent on factors which have not been controlled (e.g., the type of patients being assigned ratings). The final section of this chapter discusses a few examples of factors which may influence the accuracy of the urgency ratings.

An error component in the "true urgency" ratings could arise from inadequate patient record information. In hospital

A, the panel physicians noted when the patient record information was inadequate and did not allow them to be confident in their assessments (cf. p. 36). Out of the 250 records assigned "true urgency" ratings, there were 81 records for which one panel physician indicated the information was inadequate, three records for which two panel physicians stated the information was inadequate and no record for which the three panel physicians reported the information was inadequate. The patients were dichotomized into those for whom at least one panel physician believed the information on their patient record was inadequate and those who received no such demarcation. The percentages of agreement between the "true urgency" ratings and the staff ratings in hospital A were then calculated for these two groups of patients (Table 13). Using the proportions test, a significant difference in the percentages of agreement was not found for any of the staff members (clerk, $z = 0.02$, $p = 0.98$; nurse, $z = 0.14$, $p = 0.88$; doctor, $z = 0.92$, $p = 0.35$). Thus, there is less reason to believe that the completeness of patient records influenced the accuracy of the "true urgency" ratings in hospital A.

Other sources of error may have been present in the "true urgency" ratings which would have influenced the reported measures of staff accuracy.

TABLE 13

PERCENTAGES OF AGREEMENT BETWEEN STAFF URGENCY RATINGS AND TRUE URGENCY RATINGS DICHOTOMIZED BY ADEQUACY OF PATIENT RECORD INFORMATION FOR HOSPITAL A

	Clerk	Nurse	Physician
Patient record information inadequate for at least one panel physician to be confident in his rating	61.9% (n=83)	69.0% (n=84)	66.7% (n=84)
Patient record information adequate for all panel physicians	62.0% (n=166)	69.9% (n=166)	72.3% (n=166)

The patients assigned ratings in this study were not randomly selected. Consequently, the validity of the measures of agreement for the staff is dependent on the validity of the assumption that patient mix does not influence the ability of the staff to rate the urgency of patients.

One finding which indicated that patient mix may influence the ability of staff to assess urgency was the low Kendall correlations between the staff ratings and the "true urgency" ratings on the night shift (Table 14). Three of the fifteen Kendall correlations between staff and "true urgency" ratings by shift had probabilities greater than 0.001. These three were all obtained on the night shift (nurse, hospital A, tau = 0.190, $p = 0.063$; doctor, hospital A, tau = 0.221, $p = 0.024$; doctor, hospital B, tau = 0.266, $p = 0.009$). If persons entering the emergency department at night differed from those arriving at other times, this difference in patient mix may have decreased the accuracy of the staff in assigning urgency ratings.

It must be noted that another hypothesis for the low correlations on the night shift is that they arise from variations in the ability of individual staff members. This investigator believes both tentative explanations are worth

TABLE 14

KENDALL CORRELATION COEFFICIENTS BETWEEN THE STAFF AND TRUE URGENCY RATINGS BY SHIFT*

	Day	Evening	Night
Clerk - hospital A	0.427 (N=85)	0.397 (N=132)	0.409 (N=32)
Nurse - hospital A	0.491 (N=86)	0.493 (N=132)	0.190** (N=32)
- hospital B	0.490 (N=97)	0.304 (N=129)	0.221 (N=39)
Doctor - hospital A	0.684 (N=97)	0.368 (N=121)	0.442 (N=32)
- hospital B	0.467 (N=97)	0.486 (N=129)	0.266 (N=39)

* Hours included in Day, Evening and Night Shifts

	hospital A (clerk & nurse)	hospital A (doctor)	hospital B
Day	7.01 - 15.00	8.01 - 16.00	8.01 - 16.00
Evening	15.01 - 23.00	16.01 - 24.00	16.01 - 24.00
Night	23.01 - 7.00	0.01 - 8.00	0.01 - 8.00

** This is the only correlation which is not significant at the 0.05 alpha level.

investigating.

In hospital A, it appeared that male patients were easier for the staff to classify. This was particularly true for the clerk (males, tau = 0.5161; females, tau = 0.2465) and at least obvious for the doctor (males, tau = 0.5040; females, tau = 0.4690). In hospital B, the correlations did not differ between the nurse and doctor by more than 0.08. Therefore, it appears that the sex of the patient may be related to the accuracy of the urgency ratings for the clerk and possibly the nurse in hospital A, but had little effect on the accuracy of the ratings of the other staff members.

While this study was not designed to provide a detailed analysis of the validity of the urgency measures, these examples provided a report of some areas of concern.

Summary

The analyses for this chapter were based on 249 cases for the clerk, 250 cases for the nurse and doctor in hospital A, and 265 cases for the nurse and doctor in hospital B. In each hospital, out of all patients given an urgency rating by the nurse and doctor, 275 were randomly selected for review by the panel. Some of the charts for these patients could not be retrieved because patient names or numbers were illegible, or charts were missing due to misfiling or subsequent use. One case in each hospital was

omitted because all the panel physicians differed in their ratings. Another case in hospital A was omitted because one of the three panel physicians did not provide a rating because he believed the information on the patient's chart was inadequate.

Unanimity amongst the panel physicians was lacking in over 40% of the cases. Only one patient in each hospital was assigned an "emergent" rating by all three panel members. Slightly more than a quarter of the patients were labelled "urgent", and approximately another quarter were classed as "nonurgent" by all three panel physicians.

A statistically significant relationship existed between the urgency ratings of the three types of staff and the "true urgency" ratings derived from the panel assessments. Comparisons between the measures of accuracy for the nurse and physician showed no significant differences. The accuracy of the clerk approached that of the nurse and physician although she tended to be conservative in her ratings. She had a lower level of accuracy which was statistically significant for three of four comparisons with health professional percentages of agreement.

Experience, as defined in this study, did not influence the ability of the staff to rate urgency.

For hospital A a composite variable was derived from

responses by the patients on the perception of the urgency of their conditions. This patient's perception of urgency variable had a Kendall correlation (0.443) and percentage of agreement (68%) with the "true urgency" ratings which were within the range of values for the staff (tau: 0.434 - 0.494; percentages of agreement: 62% - 70%). Following this, a brief discussion of factors which may have influenced the accuracy of the urgency ratings was given.

The next chapter summarizes the objective, methods and findings of this study, and provides recommendations for further investigation in the area of classifying emergency department patients.

CHAPTER FIVE

SUMMARY AND RECOMMENDATIONS

Summary

The number of patients seeking care in emergency departments has been increasing. In an attempt to improve the efficiency of emergency departments, triage officers have been advocated in some hospitals to direct patients into specialized treatment areas. Very little has been written on the degree of training and experience required to adequately triage patients. Training and experience of triage officers was not examined in this study; rather the investigator examined the accuracy of emergency department staff presently working in emergency departments in sorting patients by urgency.

The staff of two Edmonton emergency departments agreed to co-operate in this study. In one hospital (hospital A) the emergency physicians, nurses, and the registration clerks participated, while in the second hospital (hospital B) only the emergency physicians and nurses were involved. The patient sample consisted of all persons seen by emergency physicians during a predetermined time period for which it was estimated that 350 patients would be seen. These patients were not randomly selected but taken consequtively as they entered the emergency

department.

The time period for the data collection was three days for the first hospital and seven days for the second. Both studies were carried out in two different time periods of June 1973.

Criteria for the urgency ratings employed (emergent, urgent, nonurgent) were developed by Vayda, Gent and Paisley (1972).

During the data collection phase, the clerk who registered a study patient in hospital A indicated whether she believed the patient was emergent, urgent, or nonurgent on an assessment form (Appendix B-1). She also noted the length of time she had worked in an emergency department by checking one of four length of experience categories: less than three months, three months to one year, one or two years, or more than two years. The clerk also wrote the patient registration number on the top of her assessment form and on top of blank nurse and physician assessment forms. She then placed her assessment form in a box at the registration desk and attached the nurse and physician forms to the patient record. In both hospitals, the nurse that accompanied the patient to an examination cubicle indicated whether she believed this patient was emergent, urgent, or nonurgent on the nurse assessment form (Appendix B-2 and B-3) attached to

the patient's record. The nurse also indicated how long she had worked in an emergency department by checking one of the same four experience categories used on the clerk's assessment form. The nurse was also responsible for asking the patient questions which were used to provide an indirect measure of the patient's perception of the urgency of his condition. These questions were not identical in the two hospitals. After the nurse had completed her form, she detached it from the patient record and placed it in a box provided at the nursing station.

The emergency physician who examined the patient rated the patient's urgency, noted how long he had worked in an emergency department, detached this assessment form from the patient's record, and placed it in a box provided at the physician's desk. Emergency physicians (for the purpose of this study) were restricted to full or part time salaried physicians who worked in the emergency department. It did not include physicians who saw their own patients in the emergency department.

To estimate the accuracy of the staff members in classifying the urgency of emergency department patients, a "true urgency" assessment was derived. To obtain an estimate of "true urgency", the records of 275 patients which had been assessed by all participating staff members, were randomly selected. These records were independently reviewed

by a panel of three physicians in each hospital. The physicians rated each patient as emergent, urgent, or nonurgent utilizing the same urgency criteria as used by the staff. The "true urgency" rating for this study was then defined to be the rating assigned by at least two of these three panel physicians. Of the 275 records selected for review in each hospital, 24 records could not be located in hospital A and 9 in hospital B.

One patient in each hospital was omitted from further analysis because all three panel physicians differed on their assessment of the urgency of the patient. In addition, one patient in hospital A was not assigned a "true urgency" rating by one of the panel physicians because he believed the information on the patient's record was not sufficient for such an assessment. Consequently, the analysis of the study was based on the assessments of 250 patients in hospital A and 265 patients in hospital B.

When the panel physician ratings were examined, it was found that only one patient in each hospital was assigned an "emergent" rating by all three physicians. About 30% of the patients were classified as "urgent" by all panel members. Approximately a quarter were labelled "nonurgent" by all three panel physicians. The panel physicians did not agree unanimously in over 40% of the ratings.

Three measures of agreement were used to report the

ability of the staff to assess urgency. They were the Kendall's correlation coefficient, percentages of agreement and the chi square goodness of fit test. The Kendall correlation coefficients between the staff and the "true urgency" ratings in hospital A ranged from 0.350 for the clerk to 0.494 for the physician. The percentages of agreement between the staff and "true urgency" ratings ranged from 62% to 70%. Using a two-tailed proportions test no significant difference was observed between the nurses and doctors. The ability of the clerk approached that of the health professionals, although she was more conservative in her assessments of urgency.

The chi square goodness of fit test was used to determine which staff members were most accurate in estimating the proportion of persons (but not necessarily the same persons) falling into the nonurgent, urgent, and emergent categories. Using a level of significance of 0.05, one would conclude that the clerk, the emergency physician in both hospitals, and the three of the panel physicians were not able to accurately estimate the "true" proportion of patients in each urgency category. It should be noted here that the panel physicians categorized the patients post hoc from the patient records. Therefore, the information available to them differed from that available to the staff who classified the patients while they were in the

emergency department. As a result of these findings, one might question the proportion of emergent, urgent, and nonurgent patients that have been reported in other studies.

The clerk's categorizations were examined further and it was found that she had a tendency to place the patients in categories of greater urgency than the panel. The clerk was the only staff member in either hospital to label all four patients "emergent" whose "true urgency" was defined to be emergent.

The second major component of this study was to investigate the effect of experience on the ability of staff to rate urgency. From the data collected, experience did not appear to account for differences in the ability to assess urgency.

As noted earlier, the nurses asked the patients questions related to the patient's perception of his own urgency. In hospital A the patients were asked (1) the length of time they had been aware of the problem which brought them to the emergency department, (2) whether or not they thought they would have to be admitted to hospital, and (3) if they didn't think they would have to be hospitalized, whether an appointment in a doctor's office in the next three days would have been as convenient. These variables were combined as follows to form a composite

patient urgency rating. (1) If the patient stated that he had had his problem for less than 24 hours and thought that he might have to stay in hospital, he was given an "emergent" rating. (2) If he thought that an appointment in a doctor's office would have been as convenient for him, or if such an appointment would not have been as convenient but he had his problem for more than 24 hours, he was classified as "nonurgent". (3) All other possible response combinations were coded as "urgent".

This composite patient urgency rating correlated 0.473 with the "true urgency" ratings. The corresponding percentage of agreement with the "true urgency" ratings was 68% which was within the percentages of agreement for the staff of hospital A. It appeared that patient self classification, employing predetermined criteria, was as accurate as the staff members' classification of urgency.

In hospital B, the patients were asked whether they had contacted a doctor prior to coming to the emergency department. Other studies have reported that physicians appear to act as a screen by discouraging patients with nonurgent conditions from visiting an emergency department. This was not the case in hospital B. Here, no significant difference was found between the proportion of nonurgent patients who tried to contact a doctor and the proportion of patients who did not try to contact their doctor.

This study did not attain the external validity required (Bracht & Glass, 1968) to generalize results to other emergency departments.

Recommendations

This study has demonstrated the need for further research in the following areas.

(1) Valid "true urgency" ratings must be developed, since any measures of accuracy in estimating "true urgency" are dependent upon the validity of the "true urgency" ratings. One could improve the "true urgency" classification by reviewing cases of evaluator discrepancy and thereby refining the criteria for "emergent", "urgent" and "nonurgent".

(2) Consideration should be given to determining the validity of a record review as compared to direct observation. This could be accomplished by having panel physicians observe a sample of patients as they enter the emergency department and rate them in a manner similar to the way the emergency physicians did in this study. After time had elapsed, so that the physicians would have difficulty recalling the conditions of most of the patients and so that further information (e.g., laboratory and x-ray results, return visits, admission to hospital) would be noted on the patient records, the panel would review the records of these patients and again assign urgency ratings. Thus, data would be provided for comparing assessments made from a record review to those made by direct observation.

(3) To improve the accuracy of classifying the urgency of patients, factors that influence the ability of staff and patients in assessing urgency must be determined. For example,

patient mix might be investigated with the objective of developing easily applied patient mix criteria which would identify patients who are difficult to classify. Triage could then be restricted to patients for whom the accuracy of the classification was considered adequate.

(4) Further attention should be given to examining the accuracy and feasibility of patients assessing the urgency of their own medical conditions, especially now when increased consumer participation is being advocated.

(5) Finally, the study pointed out that the urgency criteria employed (cf. Appendix A) did not separate patients into three proportionate groups. If benefits are to be gained by a triage system, means of separating patients into groups of sufficient size to warrant specialized treatment units must be found.

The patient demands being placed on emergency departments has accentuated the need to sort patients according to the urgency of their conditions. This study has shown that the patients themselves, the emergency department nurses, the emergency physicians, and possibly the registration clerks, were equally capable in classifying the urgency of patient conditions. Length of experience in an emergency did not influence the classification ability of the staff. These results cannot be generalized to other hospitals but this study has provided a basic design for further investigation into factors influencing the ability to classify the urgency of emergency department patients.

REFERENCES

Allen, A.B., Barnard, B.G., Falk, W., Higgs, E.R., & McCracken, J.G. A study of waiting time in an emergency department. Canadian Medical Association Journal, 1973, 109(5), 373-376.

Alpert, J.J., Kosa, J., Haggerty, R.J., Robertson, L., & Heagarty, M.C. The types of families that use an emergency clinic. Medical Care, 1969, 7(2), 55-61.

Ambuel, J.P., Cebulla, J., Watt, N., & Crowne, D.P. Urgency as a factor in clinic attendance. American Journal of Diseases in Children, 1964, 108, 394-398.

American Hospital Association. Emergency services. The hospital emergency department in an emergency care system. Chicago: American Hospital Association, 1972.

Bain, S. & Johnson, S. Use and abuse of hospital emergency departments. Canadian Family Physician, 1971, 17(5), 33-36.

Bainbridge, J.M. Accident and emergency services. Postgraduate Medical Journal, 1972, 48, 254-255.

Baldridge, P.B. The nurse in triage. Nursing Outlook, November, 1966, 14, 46-48.

Baltzan, M.A. The new role of the hospital emergency department. Canadian Medical Association Journal, 1972, 106, 249-256.

Barth, N.K. Examination of selected characteristics of emergency department activities: Ottawa Civic Hospital. Unpublished masters dissertation, University of Ottawa, School of Hospital Administration, 1967.

Beloff, J.S. Adapting the hospital emergency service organization to patient needs. Hospitals, 1968, 42, 65-69

Blalock, H.M. Social statistics. New York: McGraw-Hill, 1972.

Booker, V. & Vansant, J.H. The changing status of the emergency room. Virginia Medical Monthly, 1969, 96, 397-400.

Boyd, D.R., Mains, K.D., & Flashner, B.A. Illinois statewide trauma care system. Illinois Medical Journal, 1972, 141(1), 56-62.

Boyd, D.R., Mains, K.D., & Flashner, B.A. A systems approach to statewide emergency medical care. Journal of Trauma, 1973, 13(4), 276-284.

Bracht, G.H. & Glass, G.V. The external validity of experiments. American Journal of Educational Research, 1968, 5(4), 437-473.

Brook, R.H. & Stevenson, R.L. Effectiveness of patient care in an emergency room. New England Journal of Medicine, 1970, 283(17), 904-907.

Brown, R.E. The emergency department: Indicator of future patterns in health care delivery. Trustee, 1971, 24(7), 6-8.

Campbell, D.T. & Stanley, J.C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally, 1963.

Canizaro, P.C. Management of the non-emergent patient. Journal of Trauma, 1971, 11(7), 544-551.

Chipman, M.L., Reid, H.L., & Gordon, P.C. Emergency department. The Isaak Walton Killam Hospital for Children, Halifax, Nova Scotia. Halifax: Dalhousie University, Department of Preventive Medicine, 1973.

Cohen, J. Statistical power analysis for the behavioral sciences. New York: Academic Press, 1972.

Coleman, J.V. & Errera, P. The general hospital emergency room and its psychiatric problems. American Journal of Public Health, 1963, 53(8), 1294-1301.

Davis, C.D. Non-urgent use of a hospital emergency service. Unpublished masters dissertation, Yale University, Schools of Nursing and Medicine, 1971.

Davis, E.H. Study shows who comes to the emergency room and what happens to them after they get there. Modern Hospital, 1973, 120(6), 84-87.

Downey, G.W. Outpatient center improves care, identifies cost. Modern Hospital, 1973, 120(6), 77-80.

Estampador, N., Kessler, A.D., & Scott, R.B. How the emergency room of a general hospital serves the health needs of the children of low-income families. Medical Annals of the District of Columbia, 1968, 37, 362-364.

Fahey, J.M. Six ways to deal with the emergency room crisis. Medical Economics, November 30, 1964, 41, 65-103.

Ferguson, G.A. Statistical analysis in psychology and education. (3rd ed.) New York: McGraw-Hill, 1971.

Folse, J.R. The administration of the emergency room. Journal of Trauma, 1971, 11(7), 558-559.

Fox, R.A. & Mullany, J.W. The patient in the emergency care unit. Pennsylvania Medicine, 1973, 76(7), 63-64.

Gala, W.T. A study of selected characteristics of patients seen in the emergency department of Toronto East General and Orthopedic Hospital, Toronto, Ontario, Unpublished diploma dissertation, University of Toronto, School of Hygiene, 1969.

Garraway, W.M. The work of a casualty department. Health Bulletin, 1969, 27(3), 26-30.

Gavett, J.W., Jacobs, A.R. & Heidel, S. Ambulatory care classification and ambulatory care planning. Rochester: University of Rochester, School of Medicine, Graduate School of Management, 1970.

Gibson, G. EMS: A facet of ambulatory care. Hospitals, 1973, 47(10), 59-66. (a)

Gibson, G. The potentials and limitations of emergency medical services. Hospitals, 1973, 47(10), 57-58. (b)

Hart, P.F. Emergency triage. Hospital Administration in Canada, 1972, 14(3), 60-62.

Harvey, J.C. Categorization of emergency capabilities. Hospitals, 1973, 47(10), 69-72.

Hess, G. Health care needs inherent in emergency services. Can they be met? Nursing Clinics of North America, 1970, 5(2), 243-249.

Hochheiser, L.I., Woodward, K., & Charney, E. Effect of the neighbourhood health center on the use of pediatric emergency departments in Rochester, New York. New England Journal of Medicine, 1971, 285(3), 148-152.

Howell, J.T. & Buerki, R.C. Emergency unit in modern hospitals. Hospitals, 1957, 31, 37-39.

Jacobs, A.R., Gavett, J.W., Raquso, A., & Thurber, C. Emergency room crisis and challenge. New York State Journal of Medicine, 1972, 72, 3023-3026.

Jacobs, A.R., Gavett, J.W., & Wersinger, R. Emergency department utilization in an urban community: Implications for community ambulatory care. Journal of the American Medical Association, 1971, 216(2), 307-312.

Jesion, M.L. Public opinion and the emergency department. Unpublished diploma dissertation, University of Toronto, School of Hospital Administration, 1970.

Jonas, S. Planning for hospital emergency services. Postgraduate Medicine, 1971, 49(1), 223-227.

Jones, R.C. & Shires, G.T. Emergency room triage - preliminary lifesaving methods. Journal of Oral Surgery, 1969, 27(7), 461-468.

Kirkpatrick, J.R. Fast score for multiple trauma. Emergency Medicine, 1972, 4(10), 88-93.

Kirkpatrick, J.R. & Taubenhaus, L.J. The non-urgent patient on the emergency floor. Medical Care, 1967, 5(1), 19-24.

Kirkpatrick, J.R. & Youmans, R.L. Trauma Index. An aide in the evaluation of injury victims. Journal of Trauma, 1971, 11(8), 711-714.

Kluge, D.N., Wegryn, R.I., & Lemley, B.R. The expanding emergency department. Journal of the American Medical Association, 1965, 191, 801-805.

Lavenhar, M.A., Ratner, R.S., & Weinerman, E.R. Social class and medical care: Indices of nonurgency in the use of hospital emergency service. Medical Care, 1968, 6(5), 368-380.

Lee, S.S., Solon, J.A., & Sheps, C.G. How new patterns of medical care affect the emergency unit. Modern Hospital, 1960, 94, 97-101.

Lowe, P.J. & Baker, R.J. Organization and function of trauma care units. Journal of Trauma, 1973, 13(4), 285-290.

Maddox, G.L. & Douglass, E.B. Self assessment of health: A longitudinal study of elderly subjects. Journal of Health and Social Behavior, 1973, 14(1), 87-93.

Manegold, R.F. & Silver, M.H. The emergency medical care system. Journal of the American Medical Association, 1967, 200(4), 300-304.

McDonald, A.D., McDonald, J.C., Steinmetz, N., Enterline, P.E., & Salter, V. Physician service in Montreal before universal health insurance. Medical Care, 1973, 11(4), 269-286.

Metzmaker, C.O. & Folse, R. A trauma care center in a non-metropolitan community. Journal of Trauma, 1973, 13(4), 291-295.

Moore, G.T., Bernstein, R., & Bonanno, R.A. Effect of a neighbourhood health center on hospital emergency room use. Medical Care, 1972, 10(3), 240-247.

Morgan, D.M. An instrument for change - Policies and procedures in the mergency department. Canadian Hospital, 1972, 49(1), 37-39.

Nader group plans manual for hospital users. Modern Hospital, 1973, 120(6), 23-27.

Nahum, A.M. Emergency medical care systems. Journal of the American Medical Association, 1971, 217(11), 1530-1532.

O'Boyle, C. A new era in emergency services. American Journal of Nursing, 1972, 72(8), 1392-1397.

O'Connor, B.T. Conclusions - and a proposed pattern for reorganization. Postgraduate Medical Journal, 1972, 48, 290-294.

Paris, H. & Callan, D. City families need hospitals that offer full outpatient care at night. Modern Hospital, 1968, 110(1), 88-90.

Perkoff, G.T. & Anderson, M. Relationship between demographic characteristics, patient's chief complaint and medical care destination in the emergency room. Medical Care, 1970, 8(4), 309-323.

Read, J.G. Study of the emergency department. The Hospital for Sick Children. Hospital Administration in Canada, 1966, 8(8), 22-25.

Reed, J.I. & Reader, G.G. Quantitative survey of New York Hospital emergency room, 1965. New York State Journal of Medicine, 1967, 67, 1335.

Reifler, C.B. The Grace-New Haven Community Hospital emergency room: A descriptive study of the patient population. Unpublished doctoral dissertation, Yale University, Department of Public Health, 1957.

Robinson, G.C., Kinnis, C., Anderson, D.O., Argue, C. & Miller, H.S. Use of a hospital emergency service by children and adolescents for primary care. Canadian Medical Association Journal, 1969, 101, 543-547.

Rosenfeld, L.S. Ambulatory care: Planning and organization. New York: Health and Hospital Planning Council of Southern New York, 1971.

Roth, J.A. Utilization of the hospital emergency department. Journal of Health and Social Behavior, 1971, 12(4), 312-320.

Roth, J.A., Douglas, D.J., Howe, M. The utilization and functioning of the hospital emergency service. Unpublished manuscript, University of California, Department of Sociology, 1971.

Roy, G. An analysis of emergency department records at St. Joseph's Hospital (Toronto) to preview the possibility of triage. Unpublished masters dissertation, University of Ottawa, School of Hospital Administration, 1971.

Rudolf, L.R. The non-emergent patient in the emergency room. Journal of Trauma, 1971, 11(7), 552-553.

Saxl, J. Restructuring an OPD. Hospital Progress, 1970, 51, 63-71.

Schlesinger, A.D. Patients become part of health team. Hospitals, 1973, 47(7), 137-140.

Schnitker, M.A. Categorization of hospital emergency departments: How it was done in Ohio. Emergency Medicine Today, January 1973, 2, 1-7.

Schwartzman, N.K. New developments in the delivery of medical care to the non-hospitalized patient. Providence, Rhode Island: Rhode Island Health Research Series, Inc., 1971.

Shortliffe, E.C., Hamilton, T.S., & Noroian, E.H. The emergency room and the changing pattern of medical care. New England Journal of Medicine, 1958, 258, 20-25.

Siegal, S. Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill, 1956.

Silver, M.H., Manegold, R.F., & Gartland, J.E. The emergency department problem - An overview. Journal of the American Medical Association, 1966, 198(4), 380-383.

Skudder, P.A., McCarrol, J.R., & Wade, P.A. Hospital emergency facilities and services, a survey. Bulletin of the American College of Surgeons, 1961, 46(2), 44-50.

Slater, R.R. The triage nurse. Hospitals, 1970, 44(23), 50-52.

Stewart, M., Robertson, W.B.C., Chipman, M.L., & Gordon, P.C. Use of emergency department at the Victoria General Hospital, Halifax, Nova Scotia. Halifax: Dalhousie University Press, 1971.

Stoddard, W.D. Emergency services in Iowa: Toward more effective utilization of resources and provision of care. Health Research Series No. 15. University of Iowa, Graduate Program in Hospital and Health Administration, 1970.

Sussman, M.B., Caplan, E.K., Haug, M.R. & Stern, M.R. The walking patient: A study in outpatient care. Cleveland: Press of Western Reserve University Press, 1967.

Taubenhaus, L.J. Emergency services receiving attention. Hospitals, 1973, 47(7), 107-112.

Taubenhaus, L.J. & Simon, J. To build a better emergency department. Emergency Medicine, March, 1973, 5, 38-51.

Teglas, A.L. Patterns of emergency practice. Canadian Family Physician, 1969, 15(10), 56-59.

Trier, A.L. & Levy, R.J. Emergent, urgent and elective admissions. Studies in a general hospital psychiatric emergency service. Archives of General Psychiatry, 1969, 21, 423-430.

Vaughan, H.F. & Gamester, C.E. Why patients use hospital emergency departments. Hospitals, 1966, 40, 59-62.

Vayda, E., Gent, M., & Paisley, L. St. Joseph's Hospital - McMaster emergency study: I Methodology and findings. Unpublished manuscript, McMaster University, Department of Clinical Epidemiology and Biostatistics, 1972.

Vayda, E., Gent, M., & Paisley, L. St. Joseph's Hospital - McMaster Emergency Study: II A triage model based on an analysis of presenting complaints. Unpublished manuscript, McMaster University, Department of Clinical Epidemiology and Biostatistics, 1973. (a)

Vayda, E., Gent, M., & Paisley, L. An emergency department triage model based on presenting complaints. Canadian Journal of Public Health, 1973, 64(3), 246-253. (b)

Walker, L.L. Criteria devised to evaluate patient's needs to utilize emergency room services. Hospital Topics, 1973, 51(5), 27-29.

Webb, M.L. The emergency medical care system in a metropolitan area. Unpublished doctoral dissertation, Johns Hopkins University, 1969.

Weinerman, E.R., & Edwards, H.R. Triage system shows promise in management of department load. Hospitals, 1964, 38, 55-62.

Weinerman, E.R., Ratner, R.S., Robbins, A., & Lavenhar, M.A. Yale studies in ambulatory medical care: V. Determinants of use of hospital emergency services. American Journal of Public Health, 1966, 56(7), 1037-1051.

Wescott, L.B. Hard facts about emergency service planning. Trustee, 1971, 24(11), 1-6.

White, H.A. & O'Connor, P.A. Use of the emergency room in a community hospital. Public Health Reports, 1970, 85(2), 163-168.

APPENDIX A

A: Definitions and examples of emergent, urgent, and nonurgent conditions*

EMERGENT — Condition requires immediate medical attention;
time delay is harmful to patient;
disorder is acute and potentially threatening to life or function;
cases of this type will usually require hospitalization.

Examples:
Unconsciousness
Rapid change in level of consciousness
Severe crushing chest pain
Arrythmia or tachycardia
Shock
Pulmonary edema
Poisoning
Perforated viscus
Gunshot wound involving a major organ
Major accidental or traumatic injury
Head injury with unconsciousness or rapid change in level of consciousness
Major hemorrhage with or without trauma, regardless of site
Acute arterial embolus or thrombosis
Acute burn - second or third degree - 10% or more of body surface
Suicide attempt
Foreign body in trachea
Convulsions

URGENT — Condition requires medical attention within a few hours
there is possible danger to patient or ultimate outcome is not promptly medically attended;
disorder is of acute onset but not necessarily severe or life threatening;
patients will not usually but may require hospitalization.

Examples:
Chest pain or recent onset or of suddenly increasing severity
Shortness of breath of recent onset
Semi-consciousness or stupor
Laceration of less than 24 hours requiring sutures or dressing
Injury less than 24 hours with severe pain, severe limitation of motion, swelling and the possibility of a fracture requiring x-ray

Fracture of recent onset requiring treatment
Acute abdominal pain of recent onset - or acute abdomen
Foreign body in eye of less than 24 hours duration
Auto accident of recent onset (24 hours) requiring evaluation
Depression with threat of suicide
Acute psychosis
Neurosis not manageable by family or physician
High fever of sudden onset (>103°F)
Persistent diarrhea or vomiting - severe and of sudden onset
Rape
Incomplete abortion without major hemorrhage

NONURGENT Condition does not require the resources of an emergency service;
symptoms of long duration without sudden change in severity
referral for routine medical care is all that is needed;
disorder is not acute, it is minor in severity;
routine care in a physician's office or no medical care is required.

Examples: Upper respiratory infection
Sore foot for 5 days (regardless of cause)
Prescription renewal
Fever, mild or immediate in nature (99°F - 102.9°F)
Sprains, minor bruises or small cuts not requiring x-ray or suturing
Minor injuries or cuts of greater than 24 hour duration
Ill defined symptoms especially if over 24 hours in duration

Source: Vayda, E., Gent, M. & Paisley, L. St. Joseph's Hospital - McMaster emergency study: I Methodology and findings. Unpublished manuscript, McMaster University, Department of Clinical Epidemiology and Biostatistics, 1972.

APPENDIX B

B-1: Clerk's Urgency Rating Form

Chart Number _____

CLERK'S RATING FORM

Using the predetermined classification, please indicate the category to which, you believe, this patient belongs.

☐ EMERGENT ☐ URGENT ☐ NONURGENT

How long have you worked in an emergency department?

☐ less than 3 months ☐ 1 to 2 years

☐ 3 months to 1 year ☐ more than 2 years

When used, this form was placed on Mayfair, green paper which was of the size shown above. The forms in Appendices B-2 and B-3 were placed on 8.5 by 11 inch white bond paper.

B-2: Nurse's Urgency Rating Form for Hospital A

Who answered these questions?

☐ patient

☐ person accompanying patient

Chart number _____

Patient's Name _____

PLEASE ASK PATIENT (OR PERSON ACCOMPANYING PATIENT):

How long has the patient been aware of the problem which brought him/her to the emergency department today?

☐ less than 6 hours ☐ 1 to 7 days

☐ 6 to 24 hours ☐ more than a week

Does the patient think that he/she may have to stay in hospital?

☐ no ☐ yes

↓

IF NO, ASK:

If the patient could have obtained a doctor's appointment within the next 3 days, would this have been as convenient for him/her as coming here today?

☐ no ☐ yes

NURSE'S URGENCY RATING

Using the predetermined classification, please indicate the category to which, you believe, this patient belongs.

☐ EMERGENT ☐ URGENT ☐ NONURGENT

How long have you worked in an emergency department?

☐ less than 3 months ☐ 1 to 2 years

☐ 3 months to 1 year ☐ more than 2 years

B-2: Nurse's Urgency Rating Form for Hospital B

Who answered these questions?

☐ patient
☐ person accompanying patient

Chart number _____

PLEASE ASK PATIENT (OR PERSON ACCOMPANYING PATIENT):

How long has the patient been aware of the problem which brought him to the emergency department today?

☐ less than 6 hours
☐ 6 to 24 hours
☐ 1 to 7 days
☐ more than a week

Did you try to contact your doctor before coming to the hospital?

☐ yes ☐ no

↓

If yes, did he ask you to come to his office or to the hospital?

☐ his office ☐ hospital

NURSE'S URGENCY RATING

Using the predetermined classification, please indicate the category to which you believe this patient belongs.

☐ EMERGENT ☐ URGENT ☐ NONURGENT

How long have you worked in an emergency department?

☐ less than 3 months
☐ 3 months to 1 year
☐ 1 to 2 years
☐ more than 2 years

B-4: Physician's Urgency Rating Form

Chart Number _____

PHYSICIAN'S RATING FORM

Using the predetermined classification, please indicate the category to which, you believe, this patient belongs.

☐ EMERGENT ☐ URGENT ☐ NONURGENT

How long have you worked in an emergency department?

☐ less than 3 months ☐ 1 to 2 years

☐ 3 months to 1 year ☐ more than 2 years

When used, this form was placed on green, Mayfair paper which was of the size shown above.

B-5: PANEL PHYSICIAN'S URGENCY RATING FROM PATIENT CHARTS

Using the predetermined classification, please check the category to which, you believe, each of these patients belong.

Chart No.	EMERGENT	URGENT	NONURGENT	Chart No.	EMERGENT	URGENT	NONURGENT

B-6: Data Coded for each Patient

Variable number	Columns	Variable name	Codes
1	1	has "true urgency" rating	1= yes b= no
2	2-5	subject number	hospital A: 1-431 hospital B: 1-401
3	6	hospital	1= hospital A 2= hospital B
4	7-8	address by census tract	
5	9-10	age	
6	11	sex	1= male 2= female
7	12	marital status	hospital A: not available (NA) hospital B: 1= single 2= married 3= other
8	13-14	date	hospital A: 25-28 hospital B: 17-24
9	15-18	time in	
10	19-22	time out	
11	23	x-ray	1= no 2= yes
12	24	laboratory tests	1= no 2= yes
13	25	physician who saw patient	hospital A: 2= part time emergency physician b= full time emergency physician hospital B: NA

14	26	type of patient	hospital A: 2= Workmen's Compensation Board (WCB) patient hospital B: NA
15	27	disposition	1= discharged 2= admitted
	28-30	blank	
16	31	who answered questions	1= patient 2= person with patient
17	32	how long with problem	1= 0-6 hours 2= 6-24 hours 3= 1-7 days 4= more than 1 week
18	33	hospital A: patient thinks he would be hospitalized	1= no 2= yes
		hospital B: did patient try to contact doctor	1= yes 2= no
19	34	hospital A: patient think he could wait to see a doctor	1= no 2= yes
		hospital B: where patient is to meet doctor	1= office 2= hospital 3= unable to reach doctor
20	35	clerk's rating	hospital A: 1= emergent 2= urgent 3= nonurgent hospital B: NA
21	36	clerk's experience	hospital A: 1= less than 6 months 2= 6 months to 1 year 3= 1 to 2 years 4= more than 2 years hospital B: NA

22	37	nurse's rating	1= emergent 2= urgent 3= nonurgent
23	38	nurse's experience	1= less than 6 months 2= 6 months to 1 year 3= 1 to 2 years 4= more than 2 years
24	39	emergency physician's rating	1= emergent 2= urgent 3= nonurgent
25	40	emergency physician's experience	1= less than 6 months 2= 6 months to 1 year 3= 1 to 2 years 4= more than 2 years
26	41	hospital A: panel physician I's rating hospital B: panel physician IV's rating	1= emergent 2= urgent 3= nonurgent
27	42	hospital A: panel physician II's rating hospital B: panel physician V's rating	1= emergent 2= urgent 3= nonurgent
28	43	hospital A: panel physician III's rating hospital B: panel physician VI's rating	1= emergent 2= urgent 3= nonurgent
29	44	insufficient patient record information	hospital A: 0= not reported 1= reported once 2= reported twice 3= reported three times hospital B: NA